Journal of the Society of Arts.

FRIDAY, DECEMBER 10, 1869.

Announcements by the Council.

ORDINARY MEETINGS.

Wednesday Evenings at eight o'clock :—

DECEMBER 15.—"On India-rubber, its History, Commerce, and Supply." By J. COLLINS, Esq.

DECEMBER 22.*—"On Wines, their Origin, Nature Analysis, and Uses; with special reference to a new Alcoholic Drink made from Tea." By J. L. W. THUDICHUM, Esq., M.D.

CANTOR LECTURES.

The first lecture of the course "On the Spectroscope and its Applications," by J. NORMAN LOCKYER, Esq., F.R.S., was delivered on Monday evening last, the 6th inst. The second and third lectures will be delivered on Monday Evenings, the 13th, and 20th inst., at Eight o'clock. The whole course of lectures will be published in the *Journal*.

INDIA COMMITTEE.

The next Conference will be held this evening (Friday) December 10th, when a paper "On a Gold Currency for India" will be read by Andrew Cassels, Esq. The chair will be taken at Eight o'clock, by W. S. FITZWILLIAM, Esq.

LOCAL SCIENCE COLLEGES.

The Council have issued the following circular to members of the Society residing in the locality, calling a meeting in the Mayor's parlour, Manchester, on Friday the 17th inst. :—

SIR,—The Council of this Society have under their consideration the national importance of promoting Scientific Instruction in the United Kingdom, and they desire to draw attention to the great need which exists for the establishment of colleges and science schools in the principal centres of industry for this purpose, under a system which shall combine local action with State aid. With this object in view, the Council recommend the formation of local committees extensively, and they confidently trust that the members of the Society of Arts residing in the localities will give their aid to this movement by helping to form such committees, and serving on them. The Council have received with gratification a communication from Owens College on the subject, and a Committee is now in the course of formation for Lancashire, which will hold its meetings at Manchester. The Council hope that you, as a member of the Society, will allow your name to be placed on this Committee. A meeting will take place at Manchester, in the Mayor's Parlour in the Town Hall, on Friday, the 17th of December, at twelve o'clock, under the presidency of the Mayor, when your attendance is particularly requested.

I am, Sir, your obedient Servant,
P. LE NEVE FOSTER, *Secretary*.

* Captain O'Hea's paper on "Recent Improvements in Small Arms" is postponed till after Christmas.

The Council earnestly hope that any members of the Society, whether residing in the locality or not, who may feel interested in this movement for the promotion of scientific instruction, will endeavour to attend the meeting.

DONATIONS TO THE LIBRARY.

The following works have been presented to the Library, and the thanks of the Council have been communicated to the donors :—

Ten Pamphlets, published by La Ligue Internationale et Permanente de la Paix, Paris; presented by the League.

Harmony of the Bible, with Experimental physical Science, by the Rev. Arthur Rigg; presented by the author.

Notes on Letters Patent for Inventions and the Registration of Designs, by Francis Lloyd Wise; presented by the author.

CHANNEL STEAMERS.

The Committee to report on the seventeen models sent in competition for the prizes offered by the Society, held their first meeting on Monday, the 29th of November. Present—Lord Henry G. Lennox, M.P., Mr. E. J. Reed, C.B., Capt. Boxer, R.N., Mr. S. Teulon, Mr. C. W. Merrifield, F.R.S., and Admiral Ommanney, F.R.S.

COLLECTION OF ENGRAVINGS AND PRINTS.

The collection of prints produced by various processes, used to illustrate Mr. Davenport's paper, "On Prints and their Production," read on Wednesday evening last, will be open for the inspection of members and their friends up to Saturday, the 18th inst., inclusive.

INSTITUTION.

The following Institution has been received into Union since the last announcement :—

Birmingham, Society of Artisans.

SUBSCRIPTIONS.

The Michaelmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

FOOD COMMITTEE.

This Committee resumed its meetings on Wednesday, the 8th inst. Present, Seymour Teulon, Esq., in the chair; Mr. B. Shaw, Mr. J. T. Ware, Mr. Holland, Mr. W. H. Michael, Rev. J. E. Hall, Mr. Hyde Clarke.

The Committee had before them four tins of preserved meat, from the Melbourne Meat Preserving Company,

sent by the Colonial Office for the consideration of the Committee. (See correspondence already printed in the *Journal*, Vol. XVIII., p. 2). The specimens consisted of boiled mutton, boiled beef, and spiced beef. The mutton can be supplied wholesale at 6d., the boiled beef at 7d. per lb., cooked, and without bone. It is preserved in air-tight tins, upon the same principle as that adopted by the meat preserving firms in this country.

The Committee had also before them a tin of meat preserved raw in Australia, by "Manning's" process. This process may be shortly described as one of the many methods in which sulphurous acid is made available for preventing decomposition. This was cooked for the Committee in two ways, one fried, the other as an Irish stew.

The Committee had also before them a specimen of meat preserved by the process of Baron Fabrice. These specimens are stated to have undergone the treatment in Paris, on the 14th and 15th of September last. They were, with others, brought to the Society on the 16th of October, and have been in its custody ever since. Some portion was cooked for the Committee, and tasted this day. The specimens were dressed under the superintendence of the Baron's own French cook, and were served in the form of soup, bouilli, l œuf à-la-mode, and biftek. The actual process is a secret, but it is known that the meat is dipped in a vegetable decoction of an aromatic nature, which evidently contains tannin. The meat remains in the bath and is gradually heated to a temperature of about 100° F. It is then taken out, dried, and hung up.

The Committee had also before them a specimen of meat received from Paris, about a month since, prepared, the latter end of October, by the process of M. Thibierge, which consists in dipping the joints for five minutes into dilute sulphuric acid, of the strength of about 10 water to 1 acid. The meat, on being taken out, is carefully wiped and dried, and is then hung up for keeping. This joint (a sirloin) was roasted.

The Committee had also before them a communication from Dr. Estor, descriptive of a proposed process for the preservation of meat, the details of which will be given in a future number of the *Journal*.

Fourth Ordinary Meeting.

Wednesday, December 8th, 1869; Henry Cole, Esq., C.B., Vice-President of the Society, in the chair.

The following candidates were proposed for election as members of the Society:—

Bennett, Charles Fox, 55, Queen-square, Bristol.
Brand, Henry R., M.P., 70, Princes-gate, W.
Carter, C. R., 17, Carleton-road, Tufnell-park, N.
Farrant, R. E., The Limes, Lower Tulse-hill, S.W.
Greener, John Henry, 2, New London-street, E.C.
Hayne, C. Searle, 3, Eaton-square, S.W.
Hollebone, Frederick, Ravensbourne-park, Catford-bridge, Lewisham, S.E.
Langford, J. A., LL.D., Birmingham.

The following candidates were balloted for, and duly elected members of the Society:—

Beamish, William, 5, Elgin-road, St. Peter's-park, Paddington, W.
Berthon, Charles Septimus, 20, Margaret-street, Cavendish-square, W.
Dashwood, Captain F. L., 6, Park-street, Westminster, S.W.
Foord, John Ross, Mayor of Rochester.
Lesingham, Henry, Victoria College, Bayswater, W.
Ludlam, Thomas Edward, Marlborough Lodge, Brentford-end, Isleworth, W.
Thomson, Robert, L.D.S., Denmark-hill, Camberwell, S.E.

The Paper read was—

ON PRINTS AND THEIR PRODUCTION.

By S. T. Davenport, Esq.

This Society has ever taken an active interest in the improvement of industrial reproductive art processes, and the present has appeared to me not an inappropriate time for reviewing the course which has been followed, during the past century, by artists and others, for the purpose of creating a taste for, and an appreciation of art, and also of supplying the demand for art on the part of the public. The means resorted to in the production of prints have been of an ever-varying nature, and the object of the processes used in more recent times has been the production of impressions in larger numbers, with greater facility, less wear and depreciation of the surface from which the prints were obtained, and at less cost to the publisher, and, therefore, to the public. These conditions have especial reference to what may be termed commercial illustrative art; and I cannot but regret that, as the public have increased in their appreciation of art, the processes which have been resorted to to supply the public demand, have, of late years, been, many of them, deficient in those high qualities of art which the processes in general use 50 or 60 years ago possessed.

It will be my endeavour this evening to place before you examples illustrative of some of the various processes which have been employed or proposed for adoption, with the results obtained; and, before concluding, I shall direct your attention to two or three of the processes more recently discovered, by means of which some of the warmth, richness of effect, and artistic qualities of the past are now sought to be secured, and combined with economy and facility of production.

Into the history of the art of printing, in all its breadth, I cannot attempt to enter. Printing has been described as the means employed to impress on one substance the idea produced on another. The earliest examples of it are probably to be found in the bricks which were used by the founders of the cities on the banks of the Euphrates and Tigris; and bricks from Babylon, impressed with the cuneiform characters, may be seen in the British Museum.

"The Egyptians appear to have made a close approximation to printing; some of their wood stamps yet remain, and are capable of giving impressions in the same manner as the wood blocks of our own times. The use made of these blocks by the Egyptians was, doubtless, that of stamping clay, and bricks so impressed are frequently found. One of these stamps was found in a tomb at Thebes, and was brought to this country by Edward William Lane, Esq.; it is 5in. long and 2½in. broad.

"The ancient Romans marked their cattle and horses with a metal stamp containing letters. The stamp was dipped into fluid pitch, and was used to print on the bodies of animals; but, in the case of runaway slaves, the stamp was made hot and printed into the captive's cheek or forehead. The Roman law required that bread should be printed or stamped with what may be called a trade-mark, indicating its composition.

"Examples of this practice have been found in excavating the buried city of Herculaneum, and, in one case, the loaves thus wonderfully preserved during 1800 years were marked in the following manner:—

SILIGO E GRANIS
ET CICERE,

meaning that the finest wheat flower was mixed with the meal of peas or lentils. Marking manufactured products was a common practice among the ancient Romans, as is evidenced by the examples of pigs of lead which have been found; and, in England, by the '1st James VI., cap. 3,' by the '1st James I., cap. 7,' and the '39th Elizabeth, cap. 4,' beggars were to be branded

with a hot iron, so that the mark should remain during life." *

Thus, from the earliest ages, and in all countries, the principle of stamping or printing has been known and used; but, says John Fary, "during the dark ages of ignorance and superstition which followed the decline of the Roman Empire, all the arts and sciences were neglected in Europe. A small remnant of the writings of ancient philosophers was preserved by monks, who read and copied them without comprehending their meaning, and this they frequently perverted to suit their own reveries of magic, astrology, alchemy, and logic. . . . . After a long lapse of barbarous ignorance, the useful arts and trades which were practised by vulgar artisans were improved, and many discoveries were imported into Europe from Arabia, where science was first cultivated. By degrees the useless learning and philosophy of the schoolmen began to fall into disrepute, and the progress of civilisation was promoted by several important inventions which were made by those who were unlearned. Such was the origin of the mariner's compass, firearms, and the art of navigation, building, painting in oil, engraving, printing, &c. These inventions have produced a great and general revolution in the state of Europe, and have wonderfully improved the condition of mankind in all parts of the world."

From the reign of Charles I. to that of George II. it is well known that, in England, the arts of painting and engraving did not receive much encouragement. It is from the latter period that we have to date our history of the progress of art in this country, at which time the chief occupation of artists was painting portraits and sign-boards. To the arts of engraving and printing we are indebted for much of our knowledge of the works of artists of the past; by their aid, also, the manufactures of the country have been improved, and commerce extended. In the early part of the reign of George II., though art was little encouraged, a regular trade with the Continent existed in works of art, and it is stated that the picture-jobbers imported by shiploads "Dead Christs," "Holy Families," and "Madonnas," &c., on which they scrawled the names of Italian masters.

At the same period, literature was far in advance of the fine arts in England. Foreign engravers were employed to produce the illustrations required for the works issued to the public; even the paper on which they were printed was chiefly of foreign manufacture.

Engraving, as then practised in this country, was, like painting, almost entirely confined to portraits, the process being mezzotinto. In 1732-3, George Virtue engraved a series of portraits for an edition of "Rapin's History of England," which was, probably, the first illustrated work published in weekly numbers in London, and it is stated that thousands of copies were sold. It was upon this newly-discovered predilection of the million for illustrated works, that Hogarth, in 1733, founded his hopes of patronage for his talents as an artist, and was led to paint and engrave a series of pictures of moral subjects, treating them as a dramatic writer would, but making the picture the stage for the players, and, by certain actions and gestures, exhibiting dumb show.

Hogarth's prints of "The Harlot's Progress" were the first of the series which he published, and they were highly successful. 1,200 copies were immediately subscribed for. The subjects were copied for different articles of fashion. A piece was brought out at one of the theatres, founded upon them; and copies of them were engraved, of various sizes, and impressions spread throughout the country, and sold by means of hawkers. Hogarth, rendered sensible, by these acts of piracy, that published engravings were the common property of all adventurers, and feeling the danger to which his enterprise was consequently exposed, called a meeting of his professional brethren, and an application to Parliament for a Bill to secure to artists exclusive enjoyment of the copyright of their own works was the result.*

Up to the time of these publications, there were but two print shops in London; their trade consisted in foreign prints and in English engraved portraits, and was of very limited and unimportant extent. But the introduction to the town, from time to time, of Hogarth's visible forms of virtue and vice, by constituting framed and glazed prints fashionable decorations for rooms among the middle classes of society, the making collections for folios, and the awakening among dealers a general spirit of enterprise in engraved works, imparted to that trade an entirely new character; and the Copyright Act, obtained by Hogarth in 1734-5 (8th George II.), having given security and confidence to the various interests growing out of the new state of things, print shops were opened in various parts of the town: and whilst the works they exposed to view, by drawing the attention of the public, aided in making artists known, and in diffusing taste for art, they constituted an entirely new characteristic of the metropolis of Great Britain.

PROCESSES OF ENGRAVING.

It is not necessary that I should repeat here what I have already given in the Society's *Journal*,† viz., a detailed account of the various processes employed in the production of engravings; it will be sufficient, for my present purpose, that I should enumerate them. The processes chiefly used at the close of the last and commencement of the present century consisted of:—

Wood engraving, of which the earliest-known print bears date 1423.

Line engraving on metal plates, which appears to have been practised in England as early as 1284; and the art of etching, which is now combined with it, is attributed to Albert Dürer, and dates from the beginning of the 16th century.

Chalk, or stippled engraving, a process which seems to have been first introduced in France.

Mezzotinto, a process which is attributed to Prince Rupert; but the credit of the invention appears more properly to belong to Louis von Siegen, and dates from about 1643; and

Aquatinta, a process which was soon extensively used.

The chalk, mezzotinto, and aquatinta processes, but more especially the two last-mentioned, afforded great facilities for the production of broad effects spread over large surfaces; but the refinement, gradation of light and shadow, and force of artistic effect produced by the mezzotinto process led to its general adoption in the production of portraits; while the aquatinta process was more generally made available in landscape scenery on a large scale; but neither of the processes were used, to any great extent, as a means of illustrating books, as, in the first instance, the surface of the engraved plate rapidly wore away in the process of printing, and, in the latter case, in addition to wearing readily, there was a want of fitness for the production of minute detail on small surfaces.

Many other processes were subsequently invented and used, and are fully described in the paper before referred to, and prints obtained from such plates are exhibited, but time will not permit of my now dwelling upon them.

Hogarth employed the process known as line engraving, which, at that time, was executed on copper plates, and the success of his publications led to his employing, between 1733 and 1750, a large number of engravers, and the development of much native talent; and portrait painters soon began to exhibit in print-shop windows portraits of distinguished persons engraved after their own pictures.

In 1741, Boydell began to publish a series of views in and about London, drawn and engraved by himself. The success of this work led him to extend his plans, and to

* See "The Invention of Printing," a lecture, by Charles Tomlinson, F.R.S.

* See John Pye's "Patronage of British Art."

† See *Journal*, vol. xiii., p. 131.

his employing Bartolozzi, Basire, Walker, Erlam, and other engravers, on plates from pictures by celebrated masters. From 1750, the works of Rooker, Strange, and Woollett, as engravers, began to command attention; and, in 1752, Dalton commenced his career as draughtsman, engraver, print-seller, publisher, librarian, &c., to George III.; and, in the production of his work on Greece and Egypt, he employed the talents of Basire, Mason, Chatelan, Vivares, and others.

The engravings thus issued to the public, the action taken by artists themselves, who had now established an academy in St. Martin's-lane, the establishment of the Society of Arts, and other circumstances, ultimately led to a more general recognition of art and artists, and to the establishment of exhibitions of pictures in London, and the creation of the present Royal Academy. After the creation of the Royal Academy, the Society of Arts, which had previously paid considerable attention to painting and sculpture, directed especial attention, through its Committee of Polite Arts, to improving the arts of engraving, and the materials on which, and the ink in which, the prints were produced.

A taste for art had been developed in the minds of the people; the knowledge of and love for art continued steadily to grow, and was greatly extended by the productions of West, Reynolds, Gainsborough, Wilson, Barry, and others. So great was the success of some of those who had entered on the dissemination of prints by means of engraving, that the sanction of Parliament was obtained by Alderman Boydell, in 1804, for the disposal of his property by lottery, "he having, at that time, expended in promoting the commerce of the fine arts in this country above £350,000." *

It was soon found, however, that the cost of producing engraved works on a large scale, and of a high class, not only involved a large expenditure of time and capital, but that the expense of printing was a serious charge upon the production of largely illustrated works. It was also impossible to obtain from copper plates perfect impressions in large numbers, owing to the wear of the work in the process of printing. An enormous trade had now been created by the issue of illustrated editions of celebrated English works, and it was sought to raise magazines in public favour by embellishing them with engraved portraits, views, maps, &c.

To overcome the difficulty in the way of obtaining an increased number of perfect impressions, engraving on steel was introduced. Previous to the introduction of engraving on steel, the designs executed for the embellishment of our literature, as also many of the portraits then published, were of a decorative character; but, with the introduction of steel-plates, the ornament was given up, and a diminution in the extent of surface covered by the engraving became, in the first instance, a necessity, as steel was not only more difficult to work than copper, but the best method of acting upon it with acids had not been found out. Some of the finest examples of prints from engraved steel-plates will be found among the works of Warren, Heath, Pye, the Findens, Rolls, Lekeux, and others, and were published in the annals and other gift-books issued at the beginning of the present century. It is to be regretted that many of the best works produced and executed by a generation of artists and engravers now passed away are shut up in books which, in the present day, are all but unknown, except to collectors.

WOOD ENGRAVING.

Where a large number of illustrations were sought to be introduced into a work, the time occupied in printing tended greatly to retard publication, and we therefore find that attention was soon directed to the improvement of the art of wood-engraving, as a means of simplifying and cheapening production. This art is supposed to have been known and practised in Europe prior to 1285, having been introduced from China. Soon after engravings had become a necessary part of every book that was presented to the public, an increased amount of attention was directed to improving this art, but it did not make much progress in England until the time of Thomas Bewick, notwithstanding that the practice of lowering portions of the surface of the block, so as to graduate the tints in printing, was known.

Thomas Bewick, in 1775, received from this Society a premium of £7 7s. for his specimen of engraving on wood, and he settled in London for a short period in 1776. In 1777, he left London and returned to Newcastle, where he entered into partnership with his former master. Bewick may be considered as the introducer of the art, and he was the first to apply it with success in the delineation of animals and landscapes. The blocks cut by him, in illustration of his "History of British Birds," are some of them looked upon as his masterpieces. He was assisted in the production of many of his works by his brother John, by Luke Clennell, and others of his pupils; but though the production of the blocks had been perfected, the art of printing from their surfaces had not yet been sufficiently attended to. Several years, however, before Bewick's death, he had conceived an improvement, which consisted in printing a subject from two or more blocks, not in the manner of chiaro-scuro, but in order to obtain a greater variety of tints and a better effect than could be obtained without great labour, in a cut printed in black ink from a single block. This improvement, which had been suggested by Papillon, in 1768, Bewick proceeded to carry into effect, but before he had completed his work he had himself ceased to live. He had, however, so far proceeded with his blocks as to admit of four impressions being taken from them about a week before his death. The subject he selected for his experimental blocks was an old horse waiting for death. Bewick died in 1828, and the blocks were finished by other hands, and published in 1832.*

Many artists of ability soon rose up, and followed in the path which Bewick had so ably opened; among them were William Harvey, Robert Branston, Henry White, John Thompson, and others, whose works have become universally known in the literature of our own times.

COLOURED PRINTING.

From the earliest times, prints from wood blocks or engraved plates have been taken in black ink, and various are the means which have been resorted to, to get rid of the coldness of effect and want of transparency due to the use of such pigments alone. In 1393, soon after cards had been first printed or stencilled, in the account-book of Charles Poupart, treasurer to Charles VI. of France, there is an entry of sixty-six sols of Paris, given to Jaquemin Grinnoneur, printer, for three packs of cards, gilt and coloured, and of different sorts, for the diversion of his Majesty. That the same desire existed in this country, as soon as engraving began to take its hold on the public mind, is evidenced by the examples exhibited. Tints and colours were sought to be employed in the preparation of prints from engraved plates, whatever the process of art might be by which they were produced, and Bartolozzi early introduced the practice of printing in warm tints from the plates engraved by him, and Boydell, in some of the plates he published, printed a mezzotinto ground in warm inks over the etching. Examples of plates engraved by Erlam, and so printed, will be found in the second volume of Boydell's plates, after pictures by celebrated masters.

In 1777, the Society of Arts rewarded Mr. Robert Laurie for disclosing his method of printing mezzotinto prints in colours, and an example of the results he obtained is before the meeting. Colour printing was soon afterwards practised both at home and abroad, and the example of mezzotinto engraving by C. H. Hodges, after a picture by P. P. Rubens, and published at Amsterdam,

* See "Annual Register," Vol. xlvi, page 366.

* See Jackson s "History of Wood Engraving."

in 1807, shows what the art had attained to at that date. The examples of fruits and flowers engraved by the chalk process show the perfection to which coloured prints and printing attained in connection with that art in France; and a further illustration is afforded by the portrait of Dr. Young, printed on satin, in this country. Of all the systems of engraving, that known as line engraving was least suited to yield satisfactory results by colour printing, but a few examples are occasionally to be met with. They appear to have been published by E. Harding, of Fleet-street.

Any process of engraving which afforded a large amount of detail within a limited surface, or which failed to yield an unbroken tint when printed from, must have proved far too costly or ineffective to admit of extensive application, as inking in the plate must have been a tedious and costly operation, and much too slow for commercial adoption. The only process of engraving which, so far as I know, ever came into general use as a source of coloured prints, previous to the discovery of lithography, was the aquatinta process, and the prints so obtained were printed in various colours, by making portions of the works, and filling in the separate colours as through a stencil-plate. This was effected by small inking-rubbers, known as thumbs and fingers, and the printing was called thumb-printing. Wiping off the surplus ink required much care, and the prints so obtained were then finished by hand-colouring, after the paper on which they were printed had dried. The "View of the Rock of Gibraltar," taken from the Devil's Tongue Battery, is a fine example of this description of coloured print; it was published in 1808.

Colour-printing has now been brought to great perfection, owing to the practice followed of printing tints from flat surfaces which are free from grain, such as lithographic stones, wood blocks, &c.; and to these I must now refer.

LITHOGRAPHIC PRINTING.

The successful production of a lithographic print depends upon a combination of circumstances, viz., the quality and surface of the stone; the skill with which the drawing is made by the artist; the nicety with which the etching process is performed; the care with which the printing ink is prepared and applied; and, in the case of colour-printing, the degree of refinement and approximation of the print to the coloured work of the artist will also depend, in a great measure, upon the number of stones employed to produce the gradations of colour required in a highly-finished chromo-lithograph.

In Germany, in which country the art was discovered by Senefelder, lithography was soon regarded as a valuable ally to engraving, and it was early practised and carried to a considerable degree of perfection; but, in England, our accomplished engravers regarded it as almost too insignificant to be heeded. It was accordingly passed by almost unnoticed in England, till the success of Hulmandel's efforts called attention to the art; and the subsequent publication of Senefelder's work in London, in 1819, drew public attention to it, and from that date the art made rapid progress, and is still daily becoming more generally used in connection with both commerce and art.

To Mr. Hulmandel is due the credit of having developed in this country, not merely the capabilities of lithography proper, but also colour-printing by its means. He first applied it in copying an Egyptian painting, in which the colours were flat, and without gradation, and the outlines were printed in black ink. Mr. Owen Jones also early carried the same art to much perfection in his work on the Palace of the Alhambra, the brilliancy of colouring in which rivalled, in some instances, the painted missals of the Middle Ages; and he carried the art to a still higher point of perfection in the production of his work entitled, "Flowers, and their Kindred Thoughts;" but to Messrs. Leighton Brothers belongs the credit of having produced the first of that series of prints now known as chromatic prints, the peculiarity in the production of which consisted in the entire abandonment of black ink. The first prints so produced were published by Messrs. Rowney, in 1849, and were entitled "The Dovecot," and "A Sketch near Claines, Worcestershire." In 1850 Messrs. Hanharts produced their first chromo-lithograph. Of the large number of works so produced since, and the great improvements which have been introduced into the manipulation of the stones and colour, by Messrs. Rowney, M. and N. Hanhart, Vincent Brooks, and Dalziel Brothers, it is impossible to speak too highly; and I am enabled, by the kindness of those gentlemen, to exhibit a few specimens of their most recent productions.

The influence of the improvements effected in the art of wood-engraving and printing from wood blocks, and of lithography and litho-chromatic printing upon the older arts of engraving upon metal plates, has been such that the processes in common use fifty years ago can scarcely be said to exist now.

But while engraving has been superseded by the processes I have referred to, several new arts have been developing, the results of which, by the combined skill of men of science—artists, chemists, photographers, and mechanics, are opening to commerce new, simple, cheap, and permanent printing processes.

SURFACE BLOCKS.

I have said that commerce in art demanded in past times a higher productive power at a reduced cost; the same demand still exists. Much as the processes of production have been simplified by means of lithography and wood-engraving, still much time, labour, and cost, to say nothing of loss of artistic character and effect, too often attend the translation of the artist's design into a surface from which to print. This has led to a desire for the introduction of some process by which the artist's own sketch may be made the base from which the printing surface may be produced. In aid of this object, there are one or two processes which appear to me to be waiting a fuller development of their powers, and to be deserving of more attention than they have hitherto received in this country.

Such is the process of M. Dulos, a process almost unknown in England. It affords much force, as well as great gradation and softness of effect in the print obtained. The blocks themselves are absolute reproductions of the artist's own work, obtained by means of an amalgam of metal formed upon the drawing itself. Upon the process itself a report was issued by the Société d'Encouragement of Paris, which is published in vol. xi. of the Bulletin of that society.

The graphotype process also appears to me to be capable of much refinement in the hands of competent artists, and affords a ready means of obtaining surface blocks, from which a large amount of commercial work might be printed, in the ordinary printing machines.

Split Prints. — I may here mention, incidentally, that, as wood-block printing superseded the copper and steel-plate prints used in illustration of our literature, the practice which had been followed, in many cases, of issuing separate proof impressions, was not followed in wood-block printing, and, as a result, collectors were deprived of the facility which they had possessed for forming collections of portraits, plans, views, &c., or were reduced for a time to the necessity of introducing into such collections impressions cut from the body of the work in which the block had been published. This was but seldom done, owing to the fact that the prints so obtained were, in the majority of cases, unsatisfactory, as the type impression at the back of the wood-block generally destroyed much of the artistic effect. This has led, of late years, to the introduction of a process for splitting prints, and split prints are now mounted for collectors' folios. The specimens exhibited

illustrate the utility and advantage of the process, which is simple, certain in its action, and free from risk of injury to the print itself. The same system is now commonly applied in splitting hard papers, upon both the back and front of which drawings or etchings by eminent artists have been made.

Photography.

Photography, the process by which landscape scenery and natural objects have of late years been so beautifully rendered, has hitherto been wanting in the one important element of permanence. In speaking of photography, as I am about to do, I must not be supposed to overlook the fact that it has been, and still is, in the main, a copying process; but I believe that at the present time a new class of artistic studies is being created by its means, and new paths for the development of its powers are opening up.

It is just thirty years since the discovery by M. Daguerre of a means of fixing upon the surface of a silver plate the image obtained in the camera was given to the world by the French government. Though the results obtained by M. Daguerre were permanent in their nature, they were destined soon to be superseded by the discovery which Mr. Fox Talbot made of a means of fixing a like image upon paper. All attempts to obtain a number of prints from the daguerreotype plates failed commercially, and the power of obtaining prints by the partial transmission of light through a sheet of paper which had had an image impressed upon it by the agency of light was hailed as a great advance. Mr. Fox Talbot was not, however, satisfied with the results he then obtained. He sought a means of fixing the image upon a metal plate, so as to admit of prints being taken by the ordinary printing process. Though Mr. Fox Talbot accomplished much, and succeeded in obtaining prints from engraved plates, still, in the main, he failed to effect his object, and it was not till 1852 that the public became aware of the importance photography was likely to assume in reference to the future progress of industrial art.

In December, 1852, the Society of Arts brought together and exhibited the first collection of photographic prints, the result of French, German, and English skill; and, though but little progress had then been made in the art, it had, even at that date, been proposed to transfer the image obtained to the surface of wood blocks; "But," said Mr. Roger Fenton, in his address at the opening of the exhibition, "before sun-pictures can be extensively used in the production of letter-press, some method of copying them must be discovered which will produce as good, or better, results than the present ones, which shall be so simple in its manipulation that a workman of ordinary intelligence may be trusted to perform it, and which shall not depend upon the state of the weather for its success."

To promote a more systematic inquiry into the capabilities of the photographic art, and to aid its application to commerce and industry, the Photographic Society of London was then founded. How far the art has been advanced, and the requirements set forth by Mr. Roger Fenton fulfilled, it will now be my object to point out.

In 1853, a discussion took place at the Paris Academy, between MM. Arago, Biot, and Chevreul, as to the respective rights of Mr. Talbot, of London, and M. Niepce de St. Victor to be considered the inventors of the art of photographic engraving on plates of steel. To attain that object, Mr. Talbot had used a mixture of gelatine and bichromate of potash, which, it is stated, was modified and browned on the immediate contact of light, and only where the light acted, whilst the part covered by the object to be copied remained unchanged, and could always be removed by water. M. Niepce had aimed at perfecting the process his uncle, the inventor of heliography, described in 1827. The sensitive substance used by him was a solution of bitumen of Judea in oil of lavender. Applied as a layer, this varnish changed its properties while under the action of light. "The parts exposed to the sun became insoluble in a mixture of essence of lavender and oil of petroleum, so that they could be easily separated from the soluble part not impressed, and which represented the image to be reproduced." The liquid used by Mr. Talbot for biting in on steel was bichloride of platinum; that employed by M. Niepce was a mixture made of one part of nitric acid, eight parts of distilled water, and two parts of alcohol.

In 1851, Mr. Archer discovered the use of collodion in connection with photography. Collodion is a solution of gun-cotton in ether and alcohol. Poitevin was the first to use albumen and gelatine, mixed with the bichromate of potash, for the purpose of fixing a pigment upon paper, and thereby producing a print. Mr. Pouncy, of Dorchester, next introduced his carbon-printing process, which, although a modification of Poitevin's, was an independent discovery. He used gum arabic instead of albumen, and a porous paper into which he brushed the soluble pigmented compound. For the results he obtained, he received, in 1859, the prize offered by the Duc de Luynes, and awarded by the French Photographic Society. Since that time Mr. Pouncy has substituted oil and bitumen of Judea for the gum previously used, and he now, after exposure, dissolves out the surplus oil and bitumen by means of naphtha, and in this process of solution he is able to modify at will the force of the print. He has also produced prints on various substances, such as wood and canvas. It is owing to the combined results of carbon-printing, the collodion image of Archer, and the bichromate of potash and gelatine of Fox Talbot, with nature-printing (to which I shall hereafter refer), that the art has attained to its present position.

Gun-cotton was first introduced to the notice of scientific men in England by Professor Schönbein, of Basle, in 1849, and its solubility in ether was then alluded to. Soon afterwards, M. Le Gray, of Paris, suggested the possibility of its use photographically; but to Mr. F. Scott Archer belongs the merit of having first combined with the collodion the iodide of potassium, by dissolving it in it, thus removing the difficulties which had previously stood in the way of its use photographically. He thus became the inventor of the collodion process, an account of which he published in the pages of the *Chemist*, in March, 1851, and in 1852 he issued a small manual of his mode of operating. So important was the discovery made by Mr. Archer considered that, upon his death in 1857, a sum of money, as a testimonial fund, was subscribed by photographers on behalf of his widow and children; and upon the death of Mrs. Archer, the year following (1858), a pension of £50 per annum from the civil list to the children of the late Mr. F. Scott Archer, in consideration of the scientific discoveries of their father, was approved by Her Majesty. This was the more readily granted, as the government had become aware of the value of Mr. Archer's discoveries by the use which it was able to make of them during the Crimean War, and subsequently in connection with a series of drawings and plans executed by the Royal Engineers, in reduction of the various ordnance maps, which reductions, it was stated, had been made at an estimated saving to the country of £30,000. The prints obtained by means of the collodion negative were free from the objections which attached to printing obtained through a paper negative, as the collodion film was entirely free from grain, and much more transparent than paper; but the print obtained by its means was still of a fugitive nature.

Photo-Galvanography.—Previous to the invention of the photo-galvanographic process by Herr Paul Pretsch, no satisfactory permanent prints in carbon from plates had been obtained by means of photography, nearly all, with the exception of the daguerreotype image, being prints consisting of the salts of silver, and especially the nitrate

of silver, which had been decomposed in the body or upon the surface of the material upon which the image was produced by means of the camera; and as the visible image was developed by the combined action of several agents and reagents, it was difficult to entirely neutralise or remove them from the print, and a destructive action was constantly ready to be set up within the print itself, by the absorption of moisture by the salts of silver, or by the presence of sulphurous gases in the atmosphere, which attacked and decomposed them. To obviate this fugitive character, and to give permanence to the photographic print, was the object of many inquiries. Carbon was known to be indestructible, but how to incorporate carbon with any known substance used by the photographer, and obtain by its means the brilliancy of light and shadow seen in the silver print, was not known. The first step in the solution of this problem had, however, been taken by Mr. Fox Talbot, in the use of bichromate of potash and gelatine as an etching-ground; and the second was taken by Herr Paul Pretsch, who availed himself of the established fact that bichromate of potash and gelatine in combination, when acted upon by light, changed its nature to a greater or less degree in proportion to the intensity of the light's action; and he developed a means by which the collodion image, either positive or negative, could be impressed in the gelatine, and then converted into an image in relief. By the electrotype process he then obtained a copper plate, from which the first satisfactory impressions from carbon or printer's ink were produced. He says, in a paper read before this Society*:—"My invention consists in adapting the photographic process to the purpose of obtaining a raised or sunk design, on a glass or other suitable plate, covered with glutinous substances mixed with photographic materials, which design can then be copied by the electrotype process." The plates thus obtained by Herr Pretsch possessed many of the qualities so much desired. The image was truthfully reproduced, with all its gradations of light and shadow, and the print was permanent; but the printing surface was far from durable, and the cost of printing was a heavy charge on the product obtained. Moreover, there were many difficulties and much uncertainty involved in the production of the copper plates, and, doubtless, the want of certainty and facility of production, added to the ready wear of the surface when obtained, caused this process soon to be given up. I may add, that Herr Pretsch endeavoured to avoid the coldness of effect due to printing with black ink, not merely by using a pigment of a more agreeable tone, but he also obtained a certain amount of artistic effect, where black ink was used, by taking the impression upon prepared paper, which I may describe as a Creswick's tint, thus securing light and warmth in the foreground, a tint for the middle distance, and a sky, the want of which, in landscape photography, till recently, has been one of the deficiencies of that art.

Woodbury Type.—Nature-printing, on which the invention of Mr. Walter Woodbury is based, was discovered in this country, in 1849, by Dr. Ferguson Branson, and it became known in Austria about the same date. In Austria its great powers were first and most fully developed. It is a method of copying natural objects by embedding them in metal plates, gutta-percha, or other substances, by pressure, by casting moulds from the objects themselves, or, in some instances, partially decomposing, by means of acids, the object to be copied. Thus, a metal plate is obtained either directly or by electro-deposition, from which plate impressions can be obtained by the ordinary process of copper-plate printing. Mr. Woodbury, like Herr Pretsch, avails himself of the fact established by Mr. Fox Talbot, and employs gelatine in combination with bichromate of potash. Having obtained the photographic image in relief, by dissolving out the soluble portion of the gelatine, he imbeds the insoluble portion by pressure in a metal plate, but instead of using the plate to print from in the usual manner, he employs it as a die or seal to distribute a mixture of gelatine and carbon, the colour and amount of the carbon being regulated according to the nature of the object, and the effect sought to be obtained. Thus, after the first gelatine image has been obtained by the action of light, all subsequent prints are procured without the aid of light, by a mechanical process, and in a material indestructible under ordinary atmospheric conditions. The process has been introduced into France by Messrs. Goupil and Co. Mr. Woodbury's original communication to the Photographic Society of London, in 1865, as also a second paper on the same subject read, during the present year, will be found in the pages of the Photographic Society's *Journal*. In England, the process has been carried out under the superintendence of Mr. Woodbury himself. The prints obtained by this process are full of vigour and rich in colour, the gradations from light to shadow are delicate, and the texture and surfaces of objects are rendered with all the truth and precision observable in an ordinary photograph. This process has rendered photography an available and permanent commercial product, the impressions being obtainable in our climate, and as readily printed, during the fogs of November, as prints from an ordinary type.

Autotype.—Mr. J. W. Swan, of Newcastle, simultaneously with Mr. Woodbury, was engaged in working out a method of printing in gelatine and carbon. Mr. Swan's investigations were, however, chiefly directed to the preparation of the gelatine film, for the purpose of producing each impression in it by printing from the ordinary collodion negative by the action of light, dissolving out with warm water those portions which had remained unchanged after exposure of the gelatine under the negative image. The perfection to which Mr. Swan has carried his process is evidenced by the extensive series of works which have been produced, both in England and France, by its means. The French specimens are, many of them, *fac-similes*, in every conceivable colour and style, of drawings by celebrated masters, and are known and published in this country by the Autotype Company as autotype drawings. In carbon printing, by Mr. Swan's process, the film of gelatine and carbon is prepared of sufficient thickness and density to be practically opaque when placed upon white paper. The greatest depths of shadow in the picture result from the greatest thickness of the film remaining after the printing process has been performed; and so relatively with every succeeding gradation of tint, as, the thinner the film remaining after the excess of gelatine and carbon has been dissolved out, the brighter will the lights appear, and the white paper will become more and more apparent till it approximates to pure white light. The pigment employed may be of any desired colour or tint, as is illustrated by the examples referred to. Prints of any desired dimensions are readily produced. The preparation of the gelatine and carbon film has been the subject of many interesting experiments; and Mr. J. R. Johnson, of the Autotype Company, has now rendered the manufacture so uniform, and its action so reliable, as to justify the expectation of its being shortly supplied to the public in sheets, for the general use of photographers, in place of the paper hitherto employed. Mr. Johnson has found that, in order to fix a pigment print upon its permanent or temporary support, it is only necessary that the support should be impervious to air or water.

Thus, it will be seen that gelatine, since 1840, when Mr. Fox Talbot used it in combination with bichromate of potash as an etching ground, has played an important part in most of the recent processes which have had for their object the obtaining of permanent prints, but in the cases enumerated, secondary processes have been employed. Both Mr. Swan and Mr. Woodbury substitute gelatine and carbon in combination for the paper used by Mr.

* See *Journal*, vol. iv., p. 385.

Fox Talbot, and thus secure prints in a permanent material, but the prints so obtained have to be cut and attached to the paper mount on which they are issued to the public; and, simple as this process may appear, it was for a time a source of much difficulty and cost.

More recent investigations have led to a further development of the powers of this wonderful compound substance, and, at the present time, the tendency of investigation seems to point to the early rejection of all secondary processes, and the possibility of printing in carbon direct from the gelatine image itself; indeed, prints so produced are before the meeting.

Photo-lithography.—Many attempts have been made to obtain carbon prints by means of photographs transferred to the lithographic stone, and printed in ordinary printer's ink. Such attempts have not hitherto yielded thoroughly satisfactory results.

It must be borne in mind that a photograph is the result of the action of light upon the entire surface of whatever object is sought to be copied by its agency, and that the resulting picture is an ever-varying gradation from light to shadow. If, therefore, we attempt to transfer the image to the lithographic stone, we can only do so by giving the stone an affinity for greasy matter wherever light has acted in the production of the photograph, which is over every part of its surface, and this is at once inimical to the production of a picture, as the stone, having an affinity for the oil of the ink, will not take it up in the same variable proportions in which light has acted in the decomposition of the silver salts. To overcome this difficulty, many methods of breaking up the masses of light and shadow have been resorted to, some by giving an artificial grain or surface to the stone, others by interposing an artificial surface between the photograph to be printed and the stone itself, thereby printing upon the stone only portions of the photographic image. The necessary result of such processes has been to destroy much of the natural drawing and character of the object represented, and, at the same time, to reduce the force of the shadow and middle tints, rendering the print grey and flat in effect.

It must, at the same time, be admitted that much has been done by photography to aid the production with facility of photo-lithographs, rendering a comparatively small amount of hand-labour requisite to their finish, as will be seen by reference to the early examples of French photo-lithography, and the more recent productions by M. Lemercier, of Paris, whose fine examples will be found exhibited in that section of the collection on the walls. I am also able to show some English examples produced by Messrs. Bullock and others.

Though photo-lithography has hitherto proved its inability to produce satisfactory artistic examples, it by no means follows that, in other directions, it has not been more successfully applied. Much has been done in Australia, by Mr. J. W. Osborne, and in England, by Sir Henry James, by means of photo-lithography and photo-zincography; and where flat objects have been copied, and the texture of fabrics sought to be rendered, the most perfect success has been attained, as will be seen by examining the photo-lithographs of Indian shawls and other fabrics, prepared by Mr. Griggs, in illustration of Dr. Forbes Watson's work on "The Fabrics of India."

Mr. Griggs has also applied photo-lithography successfully to the production of photo-chromo-lithographs. In the production of the example exhibited eleven printings were involved, and the character of the fabric copied is most faithfully and minutely rendered. Photo-lithography and photo-zincography have also been, and are still, extensively used in the production of maps, plans, &c., and with highly satisfactory results; but it is of the artistic aspect of photography that we have this evening more especially to speak.

I must now return to the subject of prints from gelatine, as allied to photo-lithography. They result rom two of the most important, as well as the most recent, discoveries which have been made in reference to the reproduction of prints from photographs, and that in a permanent form, viz., M. Tessier du Motay's process—an account of which was first published about eighteen months since—and Herr Albert's process, known as the Albert-type process, for the first account of which, as well as the first examples of the process published in this country, we are indebted to Mr. G. Wharton Simpson.

The Phototype.—M. Tessier du Motay's process is said to consist in the use of a thin film of gelatine and bichromate of potash spread upon a bed or plate of copper or zinc. The film, when dry, is exposed to the partial action of light under a negative photographic image, which renders those portions acted upon by light insoluble. The negative photograph is next removed, and the gelatine is placed for two or three hours under a fine stream of cold water, after which it is dried, and is ready to print from. The surface of the gelatine, before each print is taken, is sponged with a wet sponge, as in the ordinary lithographic process, and the soluble portion of the gelatine takes up the water, while the insoluble repels it. The film is then inked as in lithographic printing, and the print is pulled in the usual way. In some cases the impression is transferred from the gelatine film to a lithographic stone, or to a plate of zinc, which is then used to produce any number of impressions, but these are not so fine as the impressions taken direct from the gelatine. Blocks which may be printed with type may also be obtained by this process. Through the kindness of M. Arosa, of Paris, by whom the process is being worked on a considerable scale, I am enabled to place before you a large number of examples of the results obtained. The process appears to be especially suited for the reproduction of architectural subjects and of sculpture, and for rendering in fine detail porcelain bodies, and no better studies of ornament could be desired to be placed before the student in art than the examples, prints of which are exhibited. The prints from the sculptured decoration of the column of Trajan, the altar of the twelve gods, and others of the examples exhibited, have not yet been published, nor, I believe, have they ever been seen by the public in this country till this evening. It is a source of much gratification to me to be able to lay before the meeting specimens produced by a process which will no doubt excite considerable interest among all lovers of reproductive art in this country.

The Albert Type.—Herr Albert's process is said to be similar in many respects to that last described, but differs in respect of the bed upon which the film is placed, and which is stated in this case to be glass. It is also asserted that two films of gelatine are now used instead of one only, the first film being combined with albumen, in addition to the gelatine and bichromate of potash, and rendered insoluble by the action of light. After drying and exposure, a second bichromatised film is poured upon the first, and, after drying, it is exposed under the negative photographic image, and the negative having been removed from the gelatine block or surface thus obtained, it is inked, and used to impress the image on to paper, not in a lithographic press, as in the former case, but after the manner of block printing, the surface of the gelatine being turned down on to the paper, and pressure applied as in an ordinary copying-press. The entire absence of grain in the impressions obtained by means of this process, the perfect gradation from light to shadow, the force of the shadows, and the fact that the prints are rendered in permanent pigments, give to this process considerable importance and value. But, in order to obtain satisfactory impressions by it, it is necessary that the surface of the paper should be as fine and free from grain as possible, and the character of the ink employed must be varied with the nature of the print desired to be obtained. Here I may add that the question of lithographic inks and their preparation is

too frequently disregarded when speaking of the lithographer's art. Much of the variety of tone and artistic effect is due to the inks used.

Mr. G. Wharton Simpson states that the specimen portrait presented by him to the subscribers to the *Photographic News*, is one of a series of eight copies of the same photograph printed at one operation; and further, that the twelve presses employed by Herr Albert are equal to the production of 12,000 copies daily. I must not, however, conclude this reference to the Albert-type process without calling attention to the examples which were recently exhibited at the exhibition of the Photographic Society, just closed, and which, through the kindness of Mr. John Spiller, the Secretary of that Society, I am permitted to place before you. The specimens were expressly forwarded to this country from Munich, by Herr Albert, for that exhibition, and show the extent of surface to which the process has already been applied, as well as the degree of force obtainable, and the gradation from light to shadow yielded by the process.

Such are some of the processes which have been introduced and are at present used in copying natural objects, the drawings of artists, and in the production of original works of art.

Photographic Surface Blocks.—At present I have said little as to the photographic processes which have from time to time been proposed to supply us with illustrations for our literature in the form of surface printing blocks. Many processes have been proposed, though but few have been successfully applied. Here, again, photography appears to come in, in aid of the object sought to be attained, with what success I am able to point out by the illustrations which are exhibited, but with the details of the processes I am not personally acquainted. The most successful processes appear to be those produced by Mr. W. J. Linton, and described as a new process for engraving for surface-printing and electro-photography, or etching on glass, both which processes are claimed to be based upon Mr. Charles Hancock's system of copying drawings, engravings, or printed matter, and of enlarging or diminishing them. In reference to the blocks produced by these processes, it is stated "that the drawings may be made in two ways, either directly upon a prepared surface of glass, or with black ink upon white paper, in which case the drawing must be reversed. When the drawing is made upon the glass with an etching needle, the glass is specially prepared with collodion, but when made upon paper it has to be copied, that is, photographed on to glass in the usual manner. The drawing is next photographically printed upon a prepared surface, and from this photographic impression an electro-plate is made, which preserves, in the most minute particulars, the lines of the original drawing. From the electro-block so obtained, any number of impressions can be printed with letter-press in the same manner as wood engravings now are." The cost of preparing electro blocks by these processes is stated to vary from 1s. 6d. to 3s. per square inch.

COMPOSITION PHOTOGRAPHS.

Let us return for a moment to the subject of photography proper. It may be urged by some, that it is, after all, only a copyist's art, and, as such, has many limits placed upon its powers which the skill of the artistic draughtsman overcomes, but which the photographer cannot overcome. To this I would reply, by admitting that there is much in nature and in art which photography cannot be expected to copy. Mind acting on matter may change the condition under which natural objects are represented, but the camera cannot alter the condition under which nature is seen. Nevertheless, we must not come to conclusions too hastily as to the unfitness for, and inability of, the photographic artist to create by means of photography as the artist does with his pencil and brush. Composition pictures have already been executed by some able artists, both from natural objects and human models, as well as copies of drawings executed by artists for the express purpose of reproduction photographically. The earliest composition photograph was produced by Mr. O. G. Rejlander, being a picture entitled "The Two Ways of Life." It was produced in 1857, for exhibition at Manchester, and the means employed in its production and the picture are fully described by its author in the pages of the Photographic Society's *Journal*, April 21, 1859. The picture consists of thirty figures and a back-ground, and was conceived and executed in six weeks. Each portion of the picture was separately photographed, and then the whole of the parts were printed in their respective positions, and were harmonised at the various points of junction by acting upon the sensitive paper by means of pencils of light.

Such was the first attempt at photographic composition; and I am able, through the kindness of Mr. Rejlander, and his friend Mr. Greenwood, of Liverpool, to whom the print belongs, to exhibit one of the original prints of that work.

Since Mr. Rejlander's picture was produced, we have had several works of a similar nature, and of great merit, presented to the public, among which, those from the studio of Messrs. Robinson and Cherrill claim priority, both as to date of production, and number and variety of subjects. Mr. Robinson's first picture was issued in 1858, and was entitled "Fading Away." The subject was selected as being eminently unsuited to rendering by any ordinary photographic treatment, and was intended to illustrate the fact that other conditions than those of actual life could be illustrated by its means. This picture was soon succeeded by others, and much adverse criticism followed, based upon ignorance of the means of their production. To correct mistaken notions, and inform the public as to their mode of production, Mr. Cherrill, in January last, read a paper before the Photographic Society, on the "Production of Composition Pictures," which paper will be found in No. 201 of that Society's *Journal*.

Messrs. Robinson and Cherrill have produced several most artistic works, some of which I am enabled, through their kindness, to exhibit this evening. The three pictures entitled "Returning Home," "The Sleepers," and "Over the Sea," show to what perfection they have now brought the art.

But fresh competitors are daily coming forward to claim the patronage of the public in this direction. Mr. J. Hubbard has issued two or three pictures, one entitled "Blighted Hopes," another, "Stolen Moments." Of the artist's skill in the treatment and lighting of his subjects it is impossible to speak too highly; they are bright and full of colour, at the same time that they are quiet, and the tale they are intended to tell is easily read and full of interest. The pictures, by the kindness of Mr. Hubbard, are exhibited.

The last work of this class to which I have to refer is full of interest from many other points of view. It is not only the last of the class produced, but it is also one of the largest. It also possesses an historical interest, and its interest is enhanced by the fact that the principal actor in the scene represented has recently passed away. Mr. McLachlan has just presented to the public a large picture, which includes portraits of all the members of the late Famine Committee which held its meetings at Manchester; of that committee the late Earl of Derby was chairman.

I have thus endeavoured to show that the artist photographers not only have the will but the power of creating for the public works which possess the richness of colour, and pictorial and artistic effects which have hitherto alone resulted from a laborious study, and translation of nature on to canvas by the artist painter.

CONCLUSION.

From what I have said, it will be seen that we have

now attained to a knowledge and use of the following modes of producing prints:—

1. By means of incised or indented surfaces, the design is produced in relief by pressure, and without colour of any kind.

2. By means of incised surfaces, a series of white lines upon a dark or coloured background are obtained by inking uniformly the entire surface of the block, and then removing the ink on to paper by pressure.

3. By means of raised surfaces, as in printing types and most wood-blocks, in which the design alone is capable of being inked, such surfaces yielding impressions in black or coloured inks, by means of pressure.

4. By means of incised metal plates, the incisions in which are charged by rubbing into them one or more black or coloured inks, and then carefully removing all the superfluous ink from the surface of the plate, after which it is covered with paper, and pressure applied.

5. By using the lithographic stone, and giving one portion of the surface of the stone an affinity for greasy matter, while other portions of the same surface are made to repel it; thus, when ink is applied and afterwards removed by pressure, flat tints or prints from simple lines are procured on the paper.

6. By using a series of surface blocks or lithographic stones, either separately or in combination, from which surfaces various tinted inks or gradations of colour are printed either separately or in combination, as exhibited in illuminated printing and chromo-lithographs.

7. By the photographic process, in which light, by acting upon the salts of silver or other bodies, decomposes them, and the image obtained in the camera is then fixed by subsequent chemical treatment.

8. By a combination of the lithographic and photographic processes, as illustrated by Mr. Griggs' specimen prints of Indian fabrics.

9. By a mechanical distribution or sealing of a mixture of carbon and gelatine, as in Mr. Walter Woodbury's process.

10. By the preparation of a uniformly dense film of black or coloured carbon and gelatine, and then submitting the film to the partial action of light, thereby fixing and changing the condition of some portions of the film, while other portions remain unchanged, and are subsequently dissolved or melted out.

11. By using the gelatine after it has been chemically prepared and submitted to the partial action of light, as a matrix which is inked and printed from in a manner analogous to the lithographic process.

Let me now direct your attention for a few moments to the prints which are still produced by the processes in use a century since. Engraving for literary and commercial purposes, I have stated, has been superseded by newer and cheaper processes of production; but from the first introduction of the art of engraving to the present time, there have been examples of higher aspirations by both artists and engravers, and greater powers of production than were needed for book illustration. But illustrations of literature, though, in the main, of a lower type than the examples of art products I refer to, still served a useful purpose—they formed the training-ground on which young and fresh aspirants for fame tried their skill, and learned to manipulate their tools and materials. I regret that that school or training-ground no longer exists; and though I feel that the productions of the artist and engraver have, up to the present time, not been excelled or superseded by any of the new art-products hitherto produced, still, I cannot fail to observe that it is probable that, at no remote period, engraving, like miniature painting, will have been swept out by the advances which the art of photography is now making. Let us hope that the result may, in the end, be favourable to the advancement of public taste. But so long as the art of engraving does exist, it is to be regretted that unprincipled persons, skilled in the practice of modern arts, are to be found, who, by copying the works of the artist and engraver, which have been produced at great cost, and, following in the steps of the hawkers of Hogarth's time, undersell the original producer, and thereby rob him of his just reward.

Hogarth found his works, as soon as published, pirated on all hands, and the Copyright Bill of George the Second's reign was passed to secure to the artist an exclusive right in the work he had created, and, till a recent date, that right had not been materially jeopardised. But, within the last few years, piracy has become so common among us, by means of photography, that the patrons of art are likely to be deprived of works such as those now produced by Landseer, Cousins, Doo, and others, by the withdrawal of the capital and enterprise which has hitherto been invested in their production; and it is only just to such persons as Mr. Graves and others that their property should be protected by an improved copyright law—a law such as the Society of Arts has been for the last two years endeavouring to introduce to the notice of the legislature, and under which the artist and photographer separately, or in connection with the capitalist, would have their rights defined and protected, and we might then look for a fresh and extended development of commercial enterprise and art-patronage.

I feel that I owe you some apology for having detained you so long. I may perhaps be open to the charge of being an enthusiast, and of attaching more importance to reproductive art than the subject merits. But, if so, the fact is easily accounted for. My boyhood and early youth were spent amidst engravings—for many of you are probably familiar with the works of my late father, who was a contemporary of Finden, Heath, Lekeux, and other eminent engravers. Many of his productions are before the meeting. I was myself educated for the same profession, and before I became an officer of this Society (now more than twenty-five years ago) I practised the art for some time. Indeed, I may mention that I was one of the first to produce, by electro-deposition, copper-plates from engraved steel-plates.

These facts must plead my justification for what I have said; and it will appear not unnatural that I should continue to take a warm interest in every new process that may promise to give greater facilities to reproductive art and thus to increase the means of affording one of the purest and best sources of gratification, not only to the rich, but to the people at large.

The Chairman said the usual custom was, that after a paper had been read it should be discussed, but on the present occasion he was inclined to think that there was a great deal more to see than to talk about, and, therefore, instead of the meeting resolving itself into a committee, to consider the many different printing processes of which Mr. Davenport had spoken, and the numerous points he had raised, he thought it would be a wiser employment of time if they confined their attention to examining the numerous interesting specimens which were displayed around the room, as well as in the library below. During the time Mr. Davenport had been speaking he had made a few notes, with a view to comment upon the paper, but he felt that any one point contained matter enough for a whole evening's discussion, and he had no doubt that, in the course of a fortnight, there would be several pages of *Notes and Queries* devoted to calling Mr. Davenport's attention to matters which he had omitted to mention, and doubtless a sufficient reply would be given. They must all agree that they owed great thanks to Mr. Davenport for the patience and industry he had displayed in collecting his materials, which were really so voluminous that almost a whole session might be taken up in this discussion. With regard to wood-cuts, having known something about them for the last forty years, he could not help thinking that Mr. Davenport was wrong in some of his conclusions with respect to them, as, for instance, when he said that the art was in the same state now as when Bewick left it. His opinion was, that it was quite the reverse. But if

he were once to begin the discussion, he should not know where to stop. He thought, therefore, they could not do better than confine their attention to the interesting specimens Mr. Davenport had collected.

Mr. S. J. MACKIE suggested that, if the arrangements of the Society would permit, the valuable collection of engravings and prints might, with great advantage, be left open for a day or two, in order that persons interested in the subject might study the different specimens more completely than was possible at that hour, and in so crowded a room. The great value of such a collection was, that it displayed the history of the art in its various phases; and this could only be studied at leisure, so as to compare the results obtained by different processes.

Mr. SEYMOUR TEULON said he cordially agreed with the suggestion which had just been made, that the collection of prints, engravings, and photographs should remain open for inspection for such a time as would allow the members to examine them at their leisure; particularly as it must be remembered that the room on the ground-floor contained many specimens equally worthy of attention. He would conclude by moving a cordial vote of thanks to Mr. Davenport for the great labour he had taken in bringing together so large a collection of art-specimens, and for the information and instruction he had given in his paper.

Lord HENRY G. LENNOX, M.P., said it required no words from him to second the motion which had just been proposed by his colleague, Mr. Teulon, but before the meeting proceeded to examine the various interesting objects around them, he was happy to be able to inform them that, in accordance with the suggestion which had been made, the pictures would remain in their places for a few days, during which time they might be examined by the members and their friends.

The motion, being put by the CHAIRMAN, was carried unanimously.

Mr. DAVENPORT thanked the meeting for the kind manner in which they had received his paper. He should be very happy to allow the collection to remain for a few days. But, before they separated, he must be permitted to suggest that a vote of thanks should be passed to the various gentlemen who had assisted him with the loan of pictures, and in the other ways which he had mentioned in the paper.

A vote of thanks was then passed to the following gentlemen, to whom the author of the paper was indebted for the loan of various interesting examples, and for other kind assistance:—J. Forbes Watson, Esq., M.D., Reporter on the Products of India to the Indian government; John Spiller, Esq., Hon. Secretary of the Photographic Society of London; G. Wharton Simpson, Esq., John T. Taylor, Esq., O. G. Rejlander, Esq., Henry Greenwood, Esq., John Pouncy, Esq., J. W. Swan, Esq., J. R. Johnson, Esq., Walter B. Woodbury, Esq., M. Arosa, of Paris; M. Lemercier, of Paris; G. W. Yapp, Esq., of Paris; W. Griggs, Esq.; Messrs. Rowney and Co., Messrs. M. and N. Hanhart; Vincent Brooks, Esq., Messrs. Robinson and Cherrill, John Hubbard, Esq., Valentine Blanchard, Esq., J. Dallas, Esq., and Messrs. Graves and Co.

In the course of the evening, Mr. Pouncy, jun., attended, and practically demonstrated his father's process; and the autotype process was also shown in operation by the kind permission of the directors of the Autotype Company. Mr. Griggs, by permission of the Indian Government, attended, and printed in gold and colours specimens of a photo-chromo-lithograph from ten stones.

Proceedings of Institutions.

HERTFORD LOCAL EDUCATIONAL BOARD.—The annual distribution of prizes and certificates obtained at the last examination of the Society of Arts, in connexion with the Board, took place on Friday, December 3rd, at the Town Hall, Hertford. The Hon. Henry R. Brand, M.P., presided. The report, read by the secretary, showed that the number of candidates who this year had come up for examination was considerably in advance of former years, and that the efforts of the Board to promote education in the outlying and rural districts have been successful. Of the seventy candidates, five had come up for the final examination, four obtaining certificates. The meeting was addressed by the Chairman, on the general advantages of education; by Robert Dimsdale, Esq., M.P., Chairman of the Local Board, on the work the Board had been doing during the year; by W. G. Larkins, Esq., of the Society of Arts, who explained the scheme and object of the Society's examinations; by R. Baker, Esq.; and by the Rev. E. H. Bradby, of Haileybury College.

INSTRUCTION IN SCIENCE AND ART FOR WOMEN.

Professor Huxley's lectures on "Physiography" conclude on the 17th of this month. Numbers eight and nine were delivered at South Kensington last Friday and Tuesday. Following those upon "Protoplasm," these have been devoted to the explanation of the variations which occur in the weather, due to the effect of the sun's heat upon the atmosphere encircling the world. It is sincerely to be hoped that the whole course of lectures may be published at some early period. They will form not only a valuable addition to standard educational works, but will be a most interesting volume for general reading. Elucidation, given in the simplest form, of phenomena hitherto comprehensible only to the limited circle of interested philosophers, would be welcomed by all. The following are the notes for lectures eight and nine:—

LECTURE VIII.

1. The ultimate conditions of the circulation of the watery and solid matters of the earth are heat and light. The great source of these, outside the earth, is the sun.

2. The sun is a globe, the surface of which consists of gaseous matters, by and through which it radiates its heat into space. Its diameter is more than a hundred times that of the earth, and its bulk more than a million times as great as that of the earth. The distance between the earth and the sun is about eleven thousand five hundred times the diameter of the earth; or a hundred and eleven times that of the sun. The sun turns round on its axis, the ends of which are its poles, once in twenty-five or twenty-eight days, and its surface is measured by imaginary meridians of longitude and parallels of longitude.

3. The earth is also a globe (rather less than 8,000 miles in diameter) the surface of which consists of gaseous matters, by and through which it radiates its heat into space. The earth turns round on its axis once in twenty-four hours. The terms poles, meridians, and parallels, have the same meaning as in the case of the sun.

4. The surface of the earth which faces the sun at any time gains more heat than it loses, and is illuminated. The opposite surface simply loses its heat and is dark.

5. If the earth and the sun had no motion relatively to one another, and if the earth were all solid, and did not rotate upon its axis, the hemisphere which happened to be turned towards the sun would be intensely hot in the middle, cooler towards the circumference, while the opposite hemisphere would be intensely cold. If there were no atmosphere, the contrast of climate would be less intense, and cold winds would blow, from all points of the compass, directly towards the middle of the hot hemisphere.

6. If the earth now began to rotate on its axis, wha

would happen would depend upon the direction of the axis.

(*a*) If the axis coincided with a prolonged radius of the sun, the only change would be in the direction of the winds.

(*b*) If the axis were perpendicular to a prolonged radius of the sun, all points of the surface at equal distances from the poles would be equally warmed and equally illuminated. The poles would be coldest, and the winds would be directed obliquely from the poles towards the equator.

(*c*) In any intermediate position, the parts of the surface at equal distances from the poles would be unequally warmed and illuminated; and one pole would be in everlasting darkness and cold.

As a matter of fact, the axis of the earth is in the position (*c*), but no part of the earth's surface is permanently dark and cold.

Lecture IX.

1. The earth moves round the sun once in three hundred and sixty-five days and a quarter; and its path, or orbit, is almost circular. The positions of the earth's axis, in all parts of its orbit, are parallel to one another; hence the pole which is at one time directed towards the sun is at another turned from it.

2. The climate of any place on the earth's surface is determined primarily by the lengths of the days and nights, and the relative duration of the seasons; and these, again, depend upon the latitude of the place.

3. Secondarily, climate is determined (*a*) by the nature of the surface, whether water or land, and if land, by the height of that land; (*b*) by currents of air; (*c*) by currents of water.

4. Land surfaces tend to have an extreme climate, water surfaces, a moderate climate. In all parts of the world, snow lies all the year round upon land elevated above a certain height. This height is the level of the perpetual snow line.

5. Currents in the air modify climate by transporting heat and water vapour from one place to another. Over a large part of the surface of the earth the winds are nearly constant in their direction.

6 Currents in the sea transport heat from one place to another. They are caused partly by the unequal heating of the sea, partly by winds. Over a large part of the surface of the earth the ocean currents are constant in their direction.

INTERNATIONAL CONFERENCE ON ART EDUCATION.

The conference held in the council room of the Palais de l'Industrie, and which has been already briefly referred to in the *Journal*, was, as already stated, organised by members of the Union Centrale, in conjunction with a certain number of representatives of other countries than France, present or absent.

The bureau was composed as follows:—President—M. Louvier de Lajolais. Vice-President—M. Paul Bénard, architect. Presidents of honour—M. Guichard, President of the Union Centrale; Henry Cole, Esq., C.B. (representing Great Britain). Vice-Presidents of honour—Baron de Schwarz (Austria); M. Canneel, Director of the Royal Academy of Ghent (Belgium); General Novitzki (Russia); M. Baümer, Professor of Architecture at the Polytechnic School of Stuttgard (Wurtemberg); M. Sajou, Vice-President of the Union Centrale. Secretaries—M. Ernest Lefebvre, lace manufacturer, secretary of the committee for the organisation of the exhibition of the Union Centrale; M. Camille Minoret, officer of the Academy of France, secretary of the consultative commission of the Union Centrale; M. J. Grangedor, professor of drawing, Paris. Secretaries-adjoints—M. Rousel, lace designer; M. Victor Lefebvre, professor of sculpture at Brussels. The above list will show that the basis of the conference was in every sense a broad one.

The attendance, during six or seven days, did not flag in the slightest degree, the largest room in the building being filled to the very last day, although the conference sat for several hours each day. Amongst the strangers present were M. de Schwarz, M. Canneel, General Novitzky, and Baümer, already named; M. V. Lefebvre; Mr. G. W. Yapp, of the English press; M. Engelhorn, editor of works on art, Stuttgard; MM. Brocard, Divigne, and Willems, Belgium; MM. Devers and Mazzuchelli, Italy. The adhesion of the following gentlemen was also officially announced:—M. de Lutzow, professor at the Ecole des Beaux Arts, Vienna; M. de Steinbeis, President of Commerce and Industry, Wurtemberg; M. de Kreling, Director of the Ecole des Beaux Arts Appliqués à l'Industrie, at Nuremberg; M. Essenwein, Director of the Musée Germanique, Nuremberg; M. Pecht, art critic, Munich; M. Grunow, Director of the Musée des Arts et Metiers, Berlin; Mr. Lubke, art critic, and M. Froschel, professor of drawing, of Berlin; M. Krombholz, professor of drawing at the Ecole des Arts-et-Metiers, Dresden.

The proceedings consisted in the discussion of four subjects, or rather divisions of the subject, of art instruction and industrial art, and the adoption of certain resolutions and memoranda, under each of these heads:—

1st. Of the character and conditions of modern productions in industrial art, the congress is of opinion:—1. That the dominant artistic character of contemporary production is essentially unsettled, on account of ill-advised over-production. 2. That the necessity for the production of large quantities of articles, in great variety, and at low prices (the introduction of machinery and division of labour) is, in general, in contradiction with the true sentiment of art in the objects produced. Also, 1. That an exaggerated value is attributed to organisation, to the detriment of individual action. 2. That apparent material perfection and the admiration for details are sought for, to the detriment of general harmony. 3. That the discoveries of science are often applied without sufficient comprehension.

2nd. Of public taste and its influence on production, and the means of developing and improving it, the congress considers that public taste is the reflection of the intellectual and moral condition of society, and that the principal causes of its insufficiency and fickleness are:—1. The tendency to make the sentiment of art subordinate to the material perfection of workmanship; and 2. The general tendency towards apparent rather than real qualities. These causes united necessarily exercise a deplorable influence on production, and the congress is of opinion that the only mode of remedying such a state of things is the introduction of a new, general, and complete system of education in matters of art, which shall propagate the soundest notions in all classes of society.

3rd. Of the actual organisation, and of the development to be given to the study of the arts of design; of the direction of such study; of professors, of methods, and of examples or copies; the congress is of opinion that the actual organisation of such instruction is not on a level with the wants of the age, because.—1. The examples which tradition furnishes are not sufficiently known, and generally badly interpreted—their spirit is misunderstood for want of education. 2. The study of nature is generally insufficient and ill-directed.

The congress declares:—1. That preparatory instruction in drawing should be introduced in primary education. 2. That the development of the sentiment of art should be commenced in early youth, by the beautiful in all its forms being daily presented to the child's eye. 3. That greater and entirely new importance should be given to museums of instruction in villages as well as in towns.

The congress is of opinion that instruction in drawing should form a part of the obligatory programme of

primary instruction. It desires to express its profound conviction that in art-education there should be no division; that the unity of art should be the only law and principle of instruction.

PRIMARY EDUCATION.

The congress cannot recognise the present principle of primary instruction, which is limited to the servile and textual imitation of copies. It is of opinion that the pupils in the common schools should, from the very outset, have placed before them those elementary geometric models which constitute the alphabet of form, as well as the simplest common objects. The congress also recommends the oral explanations of the teacher as indispensable.

SECONDARY EDUCATION.

The congress finds the present system of secondary instruction objectionable, on account of the abuse which is made of drawing copies; and it declares it to be its opinion that intellectual interpretation (the reduction or amplification of the model or copy), reproduction from memory, and choice of the modes of execution, should take the place of literal and servile copying.

PROFESSIONAL EDUCATION.

With respect to professional instruction, the congress expresses a desire that in the schools general instruction in art should take the place of any industrial application to meet a special demand. It cannot but regard all premature workmanship as dangerous to art, and injurious to the pupil's future career.

GENERAL QUESTIONS—PROFESSORS, METHODS, MODELS.

Professors.—The congress recommends the extension of instruction in drawing in the normal schools, under special professors, for primary teachers. It asks consequently for the formation of superior normal schools for the education of professors.

Methods.—The congress does not recommend nor prescribe any particular method; but it would guard against all those in which the employment of mechanical and abbreviated processes dispenses with the direct, personal, and attentive observation of the pupil.

Models and Copies.—As regards copies, the congress condemns the employment of printed copies, which possess the serious fault of substituting the study of picturesque effect, which is but an accidental character, for that of form, which is a permanent one.

4th. On comparative examination of the experiments tried in various countries to the present time, with the view of furthering the progress of industrial art, the development of public taste, and the improvement of instruction in the arts of design, the congress recognises with satisfaction:—1. That during the last few years there has been an awakening of public opinion, which has directed civilised nations towards the extension and progress of art industries, the improvement and generalisation of instruction in the arts of design, and the development of a taste inseparable from an action favourable to morality. 2. That, under the influence of this excellent spirit, efforts have been constantly made by governments, societies, and individuals, which have already given rise to the creation of important institutions—schools, societies, museums, &c.

The congress is of opinion:—1. That it is important to give effect to the proposition made at the time of the Universal Exhibition of 1867, and approved by all the honorary presidents of the international commissions, to the effect that each country should cause copies to be made of the artistic objects in its possession, and endeavour, by all possible means, to make them known and used in other countries. 2. That serious endeavours be made to improve the condition of professors devoted to instruction in the arts of design, because upon that condition depends essentially the quality of such education.

It is understood that the council of the Union Centrale is now occupied with the consideration of the means by which the measures above indicated may be carried into effect, and it is believed that the efforts of that society will not be in vain.

WHAT ART AND SCIENCE IS GIVING TO DEFENSIVE AS AGAINST OFFENSIVE WARFARE.

Mr. Edwin Chadwick, in his address, on opening the winter session of the Association for the Promotion of Social Science, in stating the subjects for the consideration of the Department of Economy and Trade, adverted to the means of economising the expenditure for war, and said:—

"I was recently at the International Statistical Congress at the Hague, and, with the kind assistance of the Dutch authorities, I was enabled to call the special attention of the governmental delegates, the economists and statists of Europe, to the need of examining the means of economising the oppressive expenditure of some hundred and eighty millions sterling of money for keeping some three millions of men under arms in camps and cantonments. The means of economising that expenditure, which I had to submit, were chiefly bringing men only for a short time under colours for military causes, allowing them to be occupied to the greatest extent in productive industry, and transferring as much as possible from the productive adult stages to the non-productive school stages of life, all military training and exercises. In the general principles propounded, and in the large position of the question, I had cordial support from the government delegates of the United States, Holland, Belgium, Switzerland, and Sweden. Prussia and France were conspicuous for their absence.

"But the question concerns the people of France more perhaps than any other in Europe. I was enabled to submit, on that occasion, one great question which has to be made known and publicly discussed as an economical question—namely, the gain from advancing science of the power of defence over the power of offence. Discussing this question with the late Captain Fowke, whose military as well as other science will be appreciated by those who knew him, he admitted that, whilst the new science gave one to offence, it gave more than two to defence. The advances made since his time in the increase of the range and of the power of arms, appeared to me to warrant the conclusion that science gives three to defence for one to offence. But I have since been told that I understated the extent of the change made. I will give it, as I have since been enabled to collect the military opinion now prevalent at the French camp at Chalons, and military opinion elsewhere in France. I submit some of the details for the information of our volunteers.

"At the sitting of the Legislative Assembly, in the discussion on army organisation, on the 20th December, 1867, Colonel Regius, a veteran of the wars of the First Empire, said—'When the range of the musket was 250 metres, and its discharge one ball a minute, and the time of a column of attack in traversing that distance was four or five minutes, although we lost men in doing it, we did it; but now, with the new arms, the range is 1,000 metres, and the rate of discharge is seven or eight a minute, and a column of attack will be exposed for fifteen or twenty minutes to the fire of the enemy in getting over that distance; the column must be annihilated before it could get to the enemy.' The common practice in France with the chassepot by the rank and file is that, at 1,000 metres, one out of five shots hits (which is a great advance upon the old musket), that at 400 metres nearly two out of five, and at 200 metres more than three out of five hit. As an example of a trial of that implement with cavalry, it is stated that in a simulated charge of the *cent guides* against eighty foot soldiers of the garde, armed with the chassepot, the distance of the target used and of the charge was 400 metres. The *cent guides* got over that distance in thirty-two seconds, during which

time the foot soldiers fired 326 balls, of which 150 hit the target, or one and a-half for each horse soldier; so that the cavalry would have been annihilated in thirty-two seconds, without having reached the enemy.

"But the Snider has a quicker fire, nearly twenty a minute, and a longer range than the chassepot; and the other day it was shown that an Adams' revolver had a discharge of more than twenty shots a minute, and an average of twenty-four shots within the space of a man's head, at sixty yards, or little less than the old firing distance. The smoke of a column, observes the Horse Guards, will obscure the aim after the first discharge. But smokeless cotton, or powder manufactured in small quantities, has yet to come, is the answer. As it is, however, the Horse Guards, which only recently condemned breech-loaders, appears to have failed to observe what was done with the chassepot at Mentana, where the advancing Garibaldian army was suddenly routed, and, before they could exchange shots, was obliged to fly before the defensive force of a simple advanced guard of three battalions of French troops, with the 'infernal fire' of their chassepots, which their commander exclaimed 'did wonders.' The poor misled Italian patriots fell before it, some with two and three bullets through their skulls. The Horse Guards have failed to observe what was done with the breech-loaders in Abyssinia, where our soldiers said Theodore's men had so little chance that, instead of its being a 'fair fight,' it was a horrible butchery, of which they felt in some degree ashamed.

"The French military opinion of the results of observations and exercises, as collected at Chalons, where the trials with the new arms have been intelligent and close, is, that the soldier who marches up to the enemy, who waits lying or behind a cover, or with only his head exposed, does so against odds of nine to one in favour of defence as against offence; that there is an end of all serious warfare with *l'arme blanche*; that swords and sword fence, bayonets and bayonet fence, are of the past, and, for the future, wicked military follies; that lancers and lances, and cuirassiers and cuirasses, will go down even before revolvers; that there is an end of all charges of cavalry, and still more completely of infantry.* The infantry soldier cannot walk to any attack, and, if he must run to it, the more he runs, the closer he gets to increasing danger. If he by miracle escaped the shots of a Snider emptied upon him, he might come upon the fire of a six-shooting Adams' breech-loader, giving all its shots upon him in almost as many seconds, and thus really offensive warfare is reduced to the extreme of difficulty against intelligent foes. *Dieu aime les gros bataillons* was a favourite saying of the French army. They now see that He has doomed them to destruction wheresoever they appear, or wheresoever men can be seen in open column. The offensive force must now, therefore, approach in some other manner, if they approach at all.

"Those two fine fellows of ours, with their cuirasses and their helmets, the 'Horse Guards,' are as monuments of the past. For the future, they can only be regarded as displays of the folly that prevails within there; or that of the representative assembly which votes for the maintenance of such dangerous folly and waste. If any soldiers are to appear there at all, it should be the Sappers, with their picks and shovels, their Sniders, and their revolvers.

"The exercises of the French army with the new arms are, as described, novel too. Speaking of the exercises at Saint Maur, a witness describes the army as being in position, on ground suited to cover it. Suddenly, at the sound of the bugle, the army disappears. It lies down behind such cover as it can get. Suddenly, on another sound of the bugle, there is discharged from the surface of the earth, an "infernal fire," before which no force can advance standing and live. But that is a defensive fire. How is the army to change position, or to get out of its cover? It can only do so with a reasonable degree of safety by crawling; and the French soldiers now say that the future of war must "be a war of serpents."*

"As it is with the new manual machinery given by science, although it requires more intelligence for its use, it is comparatively so quickly learned, as to reduce or to abolish the need of the long apprenticeships required of old—so it is with the new machinery of war. The intelligent volunteer, a citizen soldier, is more than a match with it against the common rank and file of standing armies. This new condition, in which intelligence gives the advantage to quick learning, is wholly different from the condition of the time in which Adam Smith wrote in favour of standing armies, and in depreciation of militia forces. The discipline to stand in line and move in line patiently under fire is no longer needed. What is required is the quick intelligence to get under cover and keep it. The only available mode of offensive warfare, according to the French army opinion at Chalons, is a sort of skirmishing by advances and surprises. But intelligent defenders, in a popular cause, and with superior knowledge of the country, are likely to have the advantages of surprises, from behind hedges, walls, and every sort of cover.

"In a work by Le Compte de Dreuille, 'Comment on

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* The fact is beginning to dawn on military minds in England. Thus Captain Majendie, in his Report on Small Arms, at the International Exhibition, 1867, says, "It is impossible to shut one's eyes to the fact that each successive improvement in firearms has tended to reduce proportionally the military importance of the sword, and lance, and bayonet; and that the introduction of a system by which the rate of fire of soldiers is multiplied four or five times must prove a serious blow to the practical value of this class of weapon. The occasions must henceforth be comparatively rare in which hand-to-hand contests will be possible; rarer still in which whole regiments, whether of infantry or cavalry, can come to close quarters; and these considerations must inevitably influence, sooner or later, the destiny and importance of arms specially intended for close fighting. This opinion indeed finds practical expression in a bayonet exhibited among the English arms by Mr. Scott Tucker. This bayonet is scarcely half the length of the present bayonet, and Mr. Scott Tucker suggests its adoption on the distinct ground of 'the chance of crossing bayonets being materially lessened by the introduction of breechloaders.' He claims for it the advantages of being comparatively light, cheap, strong, handy to draw and return, less easily parried, quick for thrust and withdrawal, free from chance of locking, and out of the way when skirmishing However opinions may differ as to the desirability of modifying the existing bayonet, this deliberate recognition of a new order of things is not without its significance." The Italian military men, whilst they yet flourish the now silly sword, rely on the revolver. Captain Majendie also states in his Report that a noticeable novelty is exhibited by Lafaucheux, of which specimens are to be found in the cases of Le Page and Chaurot, and other Liège makers; and in the Italian collection is a sword with a pistol in the hilt. The pistol is so arranged that the trigger falls within the sword guard, and the fire is delivered parallel to the blade of the sword. These revolvers, which are said to be used by the officers of the Italian army *in large numbers*, are invariably adapted for copper cartridges, containing their own ignition, either pin or central fire.

* A military writer, in the *Cornhill Magazine* for March, who admits that hand-to-hand fighting will cease to be possible, and that the bayonet may now be dispensed with, observes:—"Other nations have not been idle; and the broad result will be the development of military small-arm fire to an extent exceeding all former experience. Ought we to stop here? Clearly not; and the next step—a step which should no longer be delayed—appears to be sufficiently obvious. We must strive to protect our troops from the deadly fire which will henceforth be brought to bear upon them. In its way, this is no less important than the adoption of an efficient arm; but, hitherto, this branch of the subject has been *strangely neglected*. Abroad it is not neglected; nearly all the great Continental armies are busy instructing their troops in the art of seeking and obtaining cover. This is to be done in two ways—by the improvement of the skirmishing drill, and by the adoption of an efficient and ready system of field entrenchment. Under the first head, we include the necessity of teaching our soldiers that a man who exposes his whole body, who neglects to take advantage of every stone, and tree, and sheltering undulation, who is not apt in shifts and devices which have hitherto been considered more characteristic of an 'Alabama duel' than of formal military operations, is a marked, and probably a lost man Under the second head we hope, ere long, to see a serious attempt made to organise a system of spade drill, and to teach battalions to improvise cover when nature does not afford it. If we neglect these precautions we may as well throw our breech-loaders aside, for, under the circumstances, the best breech-loader in the world will fail to avert disaster and defeat."

pouvait reduire l'armée tout en assurant la defense nationale,' he shows that, with the new small arms (not to speak of the new Whitworth small artillery) one-third, or even one-fourth, of the existing army, would render the invasion of France impracticable.

"As science does this—and it is not by any means the last word of science—it renders the other two-thirds, or three-fourths, of the army in France an army of simple offence and flagrant menace. But menace of what value, and against whom? Switzerland can no longer be overrun. It has 300,000 available trained men, to whom science give a defensive power of 900,000, and who, with the Snider, and perhaps a better weapon than that, would roll back the Emperor's columns as they, with the chassepot, rolled back the Garibaldian army at Mentana. It is only recently that the independence of Belgium was spoken of in France as due solely to moral influences; for it was asserted there that it was ridiculous to suppose that the Belgian army could seriously resist that of France if she chose to move. Science has changed all that. According to the military opinion collected at the French camp at Chalons, Belgium might, if the people were so minded, make a very serious resistance indeed, and quite an effectual one.*

"I have gone thus far into military detail, to sustain the general principle of the gain from science of defence against offence, and I might show that the rule is equally applicable to naval warfare. The outlay for plate-armouring ships is like returning to plate-armour for men, in the face of small arms which will now send a bolt through three men in armour. A single low lying gun-boat with one of Whitworth's largest guns, which sends a shell through twelve-inch plates, would send to the bottom any large four or six-inch iron-clad afloat. In establishing these gains of defence in warfare, we are establishing them as great gains in international economy. Five millions of worse than waste are now, therefore, at the doors of the War Office and of our Parliament, to be retrieved for productive application. A division of labour in the prosecution of the question may aid its advancement. I submit, as a suggestion, that the examination of the mechanics of the subject, of the efficiency and power of the new machinery and arts of war for defensive purposes may be commended to the Society of Arts, whilst this association might continue the pursuit of the purely economical question, with less of hindrance than it may receive in that Society. For the interests of this country, the question is one of a large relief. For our international interests, it behoves us to set an example to Europe of the means of removing a vast incumbrance to progress of all kinds—economical, social, and political. It may be submitted for consideration, whether we might not open some correspondence on the question with our friends on the Continent."

"It may be submitted, moreover, that the great and augmenting gifts of art and science, to *defence* against *offence*—to intelligence and capital, for internal security, against barbarism, and against external violence—cannot be too soon made known to our colonies and to our Indian Government."

* Though at the Hague we had not the support by speech of M Legoyt, the most eminent statistician of France, yet we have in the following passage his powerful support by writing, expository of his view of the international interest in this great question of the cost of warfare:—"In 1869, according to estimates which we consider under rather than over the fact, Europe keeps in times of peace an effective army of 3,815,847 men, and inscribes upon its budget a sum of three and a half milliards (£140,000,000), or 32 per cent. of the whole of her expenditure, to meet the cost of this colossal army. Now, let us suppose for a moment that, as the result of an understanding between the Powers concerned, a disarmament to the extent of one-half was carried into effect. Forthwith, 1,907,924 men, of from 20 to 35 years old, the very pick of the population of that age, are restored to peaceful labour, and a saving of 1,600,000,000f. (£64,000,000) in the budgets of Europe is realised. With this sum Europe might add annually to her present railway system (at the mean cost of 150,000f. (£6,000) per kilometre) 10,000 kilometres (6,214 miles) of railway; she might complete her system of road communication of every kind in a single year; she might endow in every country and in every parish a primary school. These great improvements once realised, she might, if she determines to maintain the existing amount of taxation, apply the surplus to a progressive reduction of her debt. The annual interest of this debt being now about two and a third milliards (£95,000,000), and being capitalised at an average interest of 4 per cent., representing a capital of 57¼ milliards (2,300,000,000), might (without calculating compound interest) set her free from liabilities in about thirty-six years. If, on the other hand, the States in question choose to apply the 1,600,000,000f. (£64,000,000) thus saved to a reduction of the imposts which now press upon production or consumption, what a relief for the peoples! what a new impulse given to business of all kinds! We have said that 1,907,924 men in the prime of life would be restored to the arts of peace. There would be in this happy fact another efficacious cause of prosperity to Europe. In effect, putting the average daily earnings of these 2,000,000 of workmen at no more than 2f. each (1s. 10d.), and on the hypothesis that the wages represent a fifth part of the value produced, this pacific army, then enlisted under the flag of industry, would create a daily value of 20,000,000f. (£800,000), and an annual value of 7¼ milliards (£300,000,000). This is not all—a considerable amount of capital now employed in the fabrication of articles necessary for the equipment and armament of these 2,000,000 men, would become disposable for, and might be applied to, other branches of national industry incomparably more useful. In a word, the keeping at their firesides of 2,000,000 of young people would have the certain effect of appreciably lowering (for a time at least) the price of manual labour, and so giving a lively impulse to production in all its forms. Setting aside for a moment considerations of economy, we call attention to the advantage which a country gains by cherishing the habit and taste for work in a considerable number of adults whom garrison life now condemns to idleness and to its deadly consequences. We point, moreover, to the love of order, to the public morality, to the maintenance of family ties, which the absence of five and six years from the domestic hearth, of these youthful recruits, more or less completely violates."

FRENCH COMMERCIAL TREATIES.

The Emperor announced in his speech, at the re-opening of the Chambers, that a bill would shortly be presented to the Corps Legislatif, renewing such parts of the existing tariffs as had not given rise to any serious objections, but that no steps would be taken with respect to contested questions until a full examination of the facts had been made. The latter portion of the paragraph refers to an inquiry which is now being carried on by a commission and delegates of the Ministry of Commerce. The government added to this commission the names of several determined protectionists and manufacturers, but the former have declined to act. Their objection is supposed to be, that the commission is ministerial, instead of parliamentary or public.

The discussions connected with the tariff conventions spread all over the country, and Rouen, Roubaix, and some other manufacturing centres are loud in their demands for more protection; the advocates of free trade are, however, decidedly increasing in number, and the principles of commerce are being far more generally recognised in France than formerly. M. Jules Simon made a very effective speech on the subject the other day at Bordeaux, where free trade is naturally enough held in high honour. The protectionists disclaim any desire to return to a system of prohibition; they only, to quote the expression of M. Pouyer-Quertier, "ask for sufficient protection," which means prohibition. Against such views, as well as against the announcement of the government to consider a portion of the existing tariff as open to consideration, the Bordeaux free traders protest energetically.

The following facts, drawn from official documents, are put forth as forming a conclusive answer to the demands of the protectionists:—

In 1860, the exports of French products to England amounted to 598 millions of francs, and those from England to France, to 308 millions. In 1863, the former had grown to 800 millions, and the latter to 592 millions. In 1868, the former had increased to 862 millions, while the latter had fallen to 300 millions.

Taking in the dealings of France with all those countries with which she is allied by commercial treaties, we have the following results:—Since 1868, the exports of France have grown from 1,800 millions to 3,180 millions, and her imports from 1,600 millions to 2,793 millions.

The free-trade question, apropos to wool, is treated

shortly in the *Journal de l'Agriculture*, conducted by M. J. A. Barral. The writer says:—"In France, an agitation is on foot to raise the customs' duties on wool, and it is hoped by so doing to render the nation a great service. Our neighbours take another view of the question." He then gives extracts from German and American sources. Dr. Tellkampf says:—"It has often been pretended that the present low price of wool is caused by the increased production in Australia, yet it is well known that the flocks in that country have suffered greatly from drought. Instead of attributing the present prices to Australian production, one of the causes is to be found in the increase of duties on the import of raw wool into the United States. America has committed the serious fault of laying high duties on a raw material, and thus has done great injury to her manufacturers, as well as producers, at home and abroad. Let us see what is the effect of a high duty on wool. It was pretended that the new duties would favour the sheep farmers, and that protection would soon enable manufacturerers to pay the high duties. The high duties have profited no one, but have injured all the world. Before the alteration of the tariff, the American manufacturers bought their wool at home or abroad; but now European, Australian, Cape, and South American wool is nearly excluded from North Amercan markets, and cumbers those of Europe, and caused the low prices. This is why the German and French wool producers have suffered much of late.

"This mad protection has been fatal to all the world. There is nothing else to be done but to allow of the admission of wool duty free, as in Germany and England, except to reduce the duty on manufactured articles to a minimum.

"Some German wool producers talk of giving up, or, at any rate, of greatly reducing their flocks; they should not be in too great a hurry, but wait for better times. Similar experiments have already been made in England. The reduction of the import duties caused the prices both of wool and cereals to rise. High duties should never be levied, except upon articles considered as luxuries, such as tobacco, sugar, coffee, and spirits. The free admission of raw materials induces cheapness in consumption, by increasing competition and stimulating improvement. England finds it answers her purpose, and every country, North America especially, should adopt the same policy."

Fine Arts.

RESULTS OF THE MUNICH EXHIBITION.—The material results of the Munich exhibition have been remarkable. Two hundred works of art exhibited there have been sold, the total received for them being £13,000 sterling. These were not royal purchases merely, for the king is said to have bought only a few pictures. The number of visitors, or rather visits to the exhibibition, is reported to have amounted to 100,000, and the catalogues sold to £30,000. A lottery was established for the purchase of works of art after the fashion in France, and the directors of it have disposed of no less than 50,000 tickets. The organisation, catalogues, &c., of the exhibition, were very far indeed from being perfect, so that the results recorded above are all the more surprising, and show that the Bavarians have a true love of art.

Commerce.

COTTON SUPPLY.—A company has been formed under the title of "The East African Cotton Company," the object of which is the acquirement of land and cultivation of cotton in Zanzibar. The climate is stated to be specially suited for the cultivation of the superior qualities of cotton. The soil is rich, and labour is said to be plentiful.

Colonies.

SHEEP IN QUEENSLAND.—A Queensland paper says:—"The quantity of sheep now being boiled down for their fat, &c., is very large, partly for the sake of culling the flocks, now that it is found by experience that inferior animals do not pay to rear, and partly with the view of converting sheep stations into cattle stations. When it is taken into account that 1,600 sheep can be made into tallow per day, and that this has been going on for months, it is reasonable to look forward to an appreciable decline in the quantity of the wool produce of the colony. Either sheep must be very plentiful, or money very scarce, in a country where they are boiled down for the sake of 9½ lbs. of tallow. It is evident there is a large over-supply of sheep in the colony, and the sooner a large meat-preserving process is brought into action, with a view to exporting the surplus mutton to England, the better. The legislature of Queensland have offered to grant 5,000 acres of land for the first 750 tons of fresh meat exported from Queensland, and sold in a British market at not less than 4½d. per lb. During two months, there had been prepared, at the Red-bank Meat-preserving Establishment, by Manning's process, 14,816 tins, containing 103,826 lbs. of beef and mutton. There were about 1,500 tins still to be prepared, which would bring the quantity to over fifty tons."

Notes.

GREAT EXHIBITION AT TURIN.—It is announced that a great industrial and artistic exhibition is to be held in the year 1872, on the occasion of the completion of the piercement of Mont Cenis, but it is not stated whether it will be international, or confined to Italian productions only.

SALMON BREEDING.—A Dundee paper says that operations have commenced at Almond Mouth Fishing Station, on the river Tay, for the purpose of obtaining ova to stock the Stormontfield ponds. During the preceding week fifteen shots had been made with a net at Almond Mouth, and 45 female and 55 male salmon were landed; ten of the females were in an unfit state for spawning, but 106,000 ova in all were got and safely placed in the boxes. A clean "new run" salmon, weighing about 30 lbs., was recently landed. It was returned to the river. In Glenisla, on the Ericht, in Glentilt, Glen Lyon, and Glendochart, large numbers of salmon are to seen on the spawning beds; and on the Earn, both at Crieff and Comrie, beautiful beds of gravel have already been thrown up by the salmon in the act of depositing their ova; and should the rivers keep at their present level for a few weeks, this will be a very good spawning season.

Correspondence.

CROSSING THE CHANNEL.—SIR,—I was much gratified at hearing the paper read, on Wednesday evening last, by Mr. Zerah Colburn, on his proposition for laying a tunnel or iron tube on the bottom of the sea from England to France—assumed for a length of twenty miles from shore to shore—say, from Folkestone to Cape Grisnez, which is the shortest distance between the two countries. The tube is stated to be 14 ft. diameter outside, and in lengths of about 1,000 ft., with a thickness of metal rim of 4½ in. thickness, inside of which would be, say, two half-brick rings or arches, laid in hydraulic cement. This would reduce the clear inside diameter to 11 ft. 9 in., to carry the continental traffic to and from England, Europe, Asia, and Africa, which traffic of passengers, goods, coals, &c., will far exceed all calculations already made, when once the great commercial market is opened for a general interchange of produce,

&c. Now, assuming the possibility, and great probability, of establishing this national intercourse and interchange, I will simply ask a practical question. Is it any way likely that a single line of rails, either through a tube or tunnel, will be sufficient to carry on the great and continuous running traffic to and from England and continental nations, including India, Russia, China, and Japan, which would all be opened for railway traffic, by crossing over the Dardanelles or the Bosphorus by a railway bridge? As reasonable would it be to suppose that all the traffic to and from Fleet-street and the Strand could be passed through in single line by a lane similar to Holywell-street, in the Strand. The iron tubes, as proposed by Mr. Colburn, are to be jointed five times in the mile length—which gives above 1,000 ft. for each tubular length—so that 100 jointings must be made to cross the twenty miles of Channel bed, and, consequently, 100 serious risks or chances of terrible mishap, from rusting of the jointings laid in salt water. These tubes being circular will naturally have a tendency to roll over, which would cause a serious accident. An immense difficulty presents itself to my mind, as to how the straightforward and increased deepening of tube laying by haulage can be accomplished, down to a depth of 180 feet, or 30 fathoms, below the sea level, where no diver could work to adjust the tube over a constantly varying irregular sea bed or bottom, and give it a permanent bearing, to receive the concrete coating over it, which latter would have to be lowered down in bags or through pipes, to get the concrete in its proper place over the iron tube. Nothing has been said as to ventilation or lighting the tube, or getting rid of the waste slop of water, which will naturally accumulate in the tube from condensed steam. These points are important, and must not be over-looked or omitted; if iron tubes are to be decided on, three lines of which, at the least, should be used to ensure the uninterrupted traffic to and fro, that is, supposing tubes are chosen as the best practical mode of securing international communication. In conclusion, I beg to send you a printed extract of my proposition for a triple or three-arched tunnel under the bed of the Channel, which plans have now been before the public for the past thirteen years, awaiting a fair inspection, and (if deserving it) a recognition as worthy of competition with other proposals emanating from more powerful men, who have means and appliances at command which I do not possess. My wish is to avoid conflict with any other projectors, and in writing this plain statement, I wish to avoid offence to all, simply asking fair play. The *Engineer*, of the 19th November last, says:—"Towards the close of last year, Mr. W. Austin proposed a submarine three-way tunnel under the Channel. His plan is to cross at a line of route extending from the landing piers at Folkestone to the landing piers of Cape Grisnez, but the tunnel will range below the sea bed, at a safe depth for practical permanent masonry arches, which will be constructed of imperishable materials, on an improved principle of vertebraical bond. The tunnel is intended to pass under the submerged island called the Varne, lying near the mid-channel, and on which island Mr. Austin proposes to erect a central ventilating shaft or tower, which would be available as a permanent central lighthouse and naval signal shaft; also to afford a refuge or retreat for crews of ships wrecked in the Channel. As a fence or guard to this central tower or shaft, it is proposed to have two ranges of timber floating breakwaters, so as to act as floating retreats for ships, and protectors to the tower-shaft from hurricanes or gales. Two other masonry shafts will be permanently constructed for ventilation and pumping purposes at each shore. Seven or eight temporary shafts will also be constructed in iron, and sunk and bored down to the tunnel arching, so as to give ventilation to workers in the construction of the tunnels, and also to remove a portion of the excavated *débris*. These temporary shafts would be protected by moored floating booms or fences during the construction of the tunnel, and, on the completion of the tunnel, the temporary shafts and booms would all be removed, having done their work. The gradients or inclines of the proposed tunnels are so arranged that the steepest gradients of the two shore inclines, or connections with the main land railways in England and France, do not exceed 1 in 100, so that locomotives of moderate powers would accomplish the required work easily. Occasional openings are to be constructed in the masonry range of tunnel wall sides, so as to allow for a traverse of engines and carriages from one range of tunnel to another, in the event of any accident or emergency, when traverse frames would quickly shift the disabled carriages out of the way of an obstructed traffic. Arrangements of a distinct and peculiar character were to be made for the proper ventilation of the tunnels by air and water streams; also for the lighting the tunnels throughout by perfected modes of gas burning in specially constructed lamps, &c. Every facility will be provided for laying down a perfect system of telegraph conducting wires, which will be easily accessible for adjustment and repair; and the present great risks and accidents, now so often occurring, of tearing up telegraph cables by ships' anchors will then be avoided. Subways are to be constructed throughout the tunnel ranges, which will exhaust any accumulation of steam and waste waters, or temporary leakages, and which water will be passed through well-pits, and then ejected by pumps, connected with the great central shaft and two shore shafts. The advantages of three tunnel ranges will be to keep special, ordinary, and goods traffic trains separate and distinct, and thus obviate present causes of frequent accidents by clashing trains conveying passengers and goods on the same ranges."—I am, &c., WILLIAM AUSTIN, C.E.

8, Culmore-terrace, Carlton-road, Old Kent-road,
December 6th, 1869.

CROSSING THE CHANNEL.—SIR,—In the otherwise able and correct report of my remarks in the discussion upon Mr. Zerah Colburn's paper, on the 1st inst., a slight inaccuracy occurs which I think it due, both to Mr. Hawkshaw and to Mr. Low, to ask you to correct. Commencing at line 27, column 1, page 52, of your last issue, I am reported to have said, in reference to Mr. Low's projected boring through the chalk:—"The main point was, whether or no there was a fault in the formation. If there was not, there was no doubt of Mr. Hawkshaw being able to carry out this plan, for his abilities as a mining engineer were well known." By substituting the name of Mr. Low for that of Mr. Hawkshaw in the foregoing passage, it will be rendered correct. —I am, &c., PERRY F. NURSEY.

166, Fleet-street, London, December 4th, 1869.

PATENT LAWS.—SIR,—The legislative body in Holland considered that their patent-law was prejudicial, and not required, and voted its abolition. There is, doubtless, some foundation for this opinion, for the law contains a clause by which a patentee in Holland forfeits his rights, if he takes out a patent in any other country subsequently. The small number of patents of invention (an average of ten per annum), was alleged as a reason for the abolition; there is fair ground for inquiry, however, whether the effect has not been taken for the cause; the character of the Dutch people for practical good sense lends weight to the conclusion. It is true, their reputation as an agricultural and mercantile people, and their peculiar temperament, are not favourable to a high development of inventive genius, as evidenced by some of their products, and direct them to a more immediate and less uncertain investment of their time and capital than that of patents; yet, for these reasons also, it may be urged that such a limitation as the one referred to would operate more forcibly, as it is both tyrannical and subversive of the inventor's interests. In all cases it would appear to have been advisable to have tried a law excluding this arbitrary enactment before carrying out an entire abolition. Countries like Holland and Switzerland may not suffer directly, or to the same

extent, as large manufacturing countries like England and France, from the absence of a stimulus to native invention. They may find it answer to benefit by their improvements without contributing to the premium by which they were acquired; but were such an example followed by any of the leading states of Europe, it would infallibly prove a losing game, degrading to the country who practised it, and, in the long run, a cause of retrogression in the arts of civilisation generally.—I am, &c.,

L. DE FONTAINEMOREAU.

4, South-street, Finsbury.

MEETINGS FOR THE ENSUING WEEK.

MON.....Society of Arts, 8. Cantor Lecture. Mr. J. Norman Lockyer, F.R.S., "On the Spectroscope and its Applications."
Social Science Assoc., 8. Mr. E. W. Hollond, "On the Employment of Paupers."
Society of Engineers, 7½. Annual General Meeting.
R. Geographical, 8½. 1. Mr. G. S. Hayward, "Journey across the Kuen-lun to Yarkand and Kashgar." 2. Dr. Cayley and Messrs. Douglas Forsyth and Shaw, "Reports on Trade Routes from India to Eastern Turkestan."
British Architects, 8.
Medical, 8.
London Inst., 4.

TUES ...East India Assoc., 3. Lieut.-Gen. Sir A. Cotton, "On the Proposed Expenditure of £100,000,000 additional on Railways."
R. Medical and Chirurgical, 8½.
Civil Engineers, 8. Mr. Grantham, "On Ocean Steam Navigation."
Photographic, 8.
Anthropological, 8.

WED ...Society of Arts, 8. Mr. J. Collins, "On India-rubber, its History, Commerce, and Supply."

THUR ...Royal, 8½.
Antiquaries, 8½.
Linnæan, 8. Mr. Daniel Hanbury, "On a Species of *Ipomœa* affording *Tampico Jalap*."
Zoological, 4.
London Inst., 7½.
Chemical, 8.
Numismatic, 7.
Philosophical Club, 6.

FRI .....Philological, 8½.
Quekett Club, 8.

Patents.

From Commissioners of Patents' Journal, December 3.

GRANTS OF PROVISIONAL PROTECTION.

Advertising sheets or papers—3389—F. J. Granville and H. Gardner.
Banjoes, &c.—3352—W. Temlett.
Battery guns, revolving—3341—A. M. Clark.
Boilers—3359—J. H. Fraser.
Boilers for hot-water apparatus—3333—J. Hartley and Z. Sugden.
Boilers, &c., apparatus for feeding—3323—E. Körting.
Blacking, manufacturing—3410—A. McDougall.
Bricks, burning—3270—S. W. Shaw.
Cabs, &c., means of communication between passengers and drivers in—3334—T. E. Lundy and J. L. Dunham.
Calico-printing, machinery for engraving cylinders used in—3343—W., J., and F. W. Edmondson and R. Cunliffe.
Carding machines, &c., apparatus for feeding wool, &c., to—3402—P. C. Evans and H. J. H. King.
Cast-iron earth screws for the lower parts of fence, &c.—3340—W. and M. Bayliss.
Collars, cuffs, &c.—3414—G. M. Felton.
Cotton, &c., machinery for preparing, &c.—3353—T. R. Hetherington.
Cotton, &c., packing bales of—3331—S. Mendel.
Electro-magnetic machines, &c.—3363—J. Burroughs, jun.
Electro-metallurgy—3377—H. A. Bonneville.
Feet-warming apparatus—3362—J. Moseley.
Fibrous substances, spinning—3368—J. Bottomley and S. Emsley.
Fire escapes—3371—F. Hawkings.
Fluids and liquids, apparatus for forcing and drawing—3398—S. Chatwood and T. Sturgeon.
Furnaces—3301—W. Lancaster.
Furnaces—3349—J. Taylor.
Gas, lighting and extinguishing by electricity—3396—D. Miles.
Gas, apparatus used in manufacturing—3395—J. B. Paddon.
Hats—3401—W. C. Mann.
Hats, &c., apparatus for felting—3394—J. and B. Dunkerley.
Horses, &c., apparatus for clipping—3356—S. H. Salom.
Hydraulic presses—3400—J. Downs.
Hydraulic presses, &c., constructing—3364—R. Wilson.
Knitting machines—3121—H. B. Barlow.
Lubricating oil or grease, manufacturing—3354—D. Morgan.
Lubricators—3346 H. Wilson.
Manure, &c., preparing ashes for—3329—G. Petrie.
Match and fusee boxes—3361—J. Macneill.
Match splints, &c., apparatus for filling—3412—L. Mount.
Metal surfaces, &c., composition for coating—3274—W. E. Gedge.
Motive-power engines—3387—H. C. Lübnitz.
Motive-power, utilising streams, &c., as—3344—C. D. Abel.
Ores, &c., treating—2795—J. Stuart.
Pavements, constructing—3370—R. Hennell.
Pillar letter boxes, &c.—3365—S. W. Wilkinson and J. E. Dooley.
Pills, &c., machinery for making—3406—B. Goddard and W. Finley.
Pirns, winding thread or yarn upon—3325—J. P. Kerr and W. McGee.
Pneumatic tubes, &c.—3345—J. Cochrane.
Power, obtaining—3390—W. Thomas.
Pressure gauges—3385—F. Foster.
Pumps—3337—R. K. Miller and A. B. Herbert.
Railway carriages—3339—W. N. MacCartney.
Railway carriages, &c., connecting and disconnecting—3397—J. Turnbull.
Railway carriages, &c., transporting—3399—M. Henry.
Railways, self-acting apparatus for placing fog signals upon—3393—J. Norris and E. Longworth.
Safes for ships carrying mails, specie, &c.—3388—A. McNeill.
Saws, machinery for grinding—3386—J. H. Johnson.
Saws, &c.—3379—S. G. Arnold.
School forms and desks—3404—T. Richardson.
Ships' bottoms, &c., composition for preventing fouling of—3314—T. Marshall.
Ships, machinery for propelling—3408—W. R. Lake.
Shuttles for weaving—3369—J., J., and H. Ingham and C. Smith.
Spinning machinery, washer cloth for—3351—T. Aitkin.
Steam boiler supply cocks—3376—H. A. Bonneville.
Steam boilers, preventing and removing incrustations in—3285—C. D. Saintgeot and C. Poucel.
Steam boilers, &c., water gauges for—3367—J. Bourne.
Steam carriages for common roads—3384—A. Nairn.
Stone, &c., machinery for breaking—3089—T. Bevington, S. Courtauld, and J. A. Norberg.
Stone, &c., machinery for dressing—3391—J. Fogg.
Tents, sunshades, and umbrellas—3372—G. and J. Ritchie.
Terriers or ground augers—3231—A. Bohlken.
Textile fabrics, geoffering and plaiting—3338—J. Orson.
Textile fabrics, weaving—3336—R. Clews.
Thread, &c., machinery for drying, dressing, and finishing—3332—J. Dockray.
Tramways, &c., constructing—3375—E. E. Allen.
Vent peg for preserving liquors of all kinds—3327—M. Shelley.
Washing machines, &c.—3416—W. Pollitt and W. J. Knowles.
Weighing machines or scales—3219—J. C. Heywood.
Wheat, &c., machine for cleaning cracked—3260—M. Benson.
Window sashes, apparatus for tightening and holding—3360—S. L. Loomis.
Wood, machinery for working—3320—G. R. Sweetser & G. Wadman.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Sewing machines—3441—W. Brookes.
Railway carriages, journal bearings for—3456—W. R. Lake.

PATENTS SEALED.

1724. J. Edge.
1737. T. Wilkins and W. Fisk.
1750. W. B. Leachman.
1758. F. Heckner.
1759. W. Sellers.
1760. G. Fenner.
1764. C. E. de Lorière.
1782. A. St. C. Radisson.
1802. E. T. Hughes.
1812. J. H. Brown.
1814. W. R. Lake.
1823. W. R. Lake.
1926. S. Joy.
2007. J. Steward.
2024. W. R. Lake.
2232. R. Boyd.
2354. W. R. Lake.
2355. W. R. Lake.
2537. W. R. Lake.
2625. S. F. and A. B. Ibbotson.
2697. W. E. Newton.
2789. H. A. Bonneville.
3025. J. Player.
3028. J. M. A. Stroh.

From Commissioners of Patents' Journal, December 7.

PATENTS SEALED.

1767. H. Carter & G. H. Edwards.
1768. D. Cole.
1774. W. E. Gedge.
1776. D. J. Field and I. W. Lister.
1777. J. Mabson.
1792. J. Blair.
1799. J. G. Marshall.
1809. A. Lafargue.
1888. J. B. Brooks and G. Picken.
1891. S. Nicholls.
1902. C. D. Abel.
1918. A. J. Deblon.
1921. A. M. Clark.
1931. A. H. Still and D. Lane.
1966. B. Templar.
1991. E. Roe.
2026. W. E. Newton.
2050. W. E. Newton.
2323. A. Louden.
2763. R. C. Wallace and D. Crawford.
2834. W. and A. Kempe.
2922. G. W. Hawksley and M. Wild.
2988. C. W. Siemens.
2990. E. Lane.
3106. J. Sheldon.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

3171. J. T. A. Mallet.
3178. W. H. Harfield.
3222. J. C. MacDonald and J. Calverley.
3155. P. McGregor.
3193. T. Bayley and J. Taylor.
3237. G. Haseltine.
3190. E. L. Paraire.
3195. C. E. Brooman.
3179. J. A. Coffey.
3189. W. H. Richardson.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

3262. L. Christoph, W. Hawksworth, and G. P. Harding.
3259. R. Hornsby, jun.
3230. G. F. Blumberg.
3310. S. B. Whitfield.